the OIL AND GAS JOURNAL

Yes, Get on the Job Right Now

And BE SURE YOU SEND ONE of YOUR FRANKS UNITS

FRANKS SERVICING AND WORKOVER UNIT FAMILY

This ad introduces Franks 1953 family of models of servicing units—improved units that will continue to lead the field in preference by both contractors and company superintendents.

CRUISER

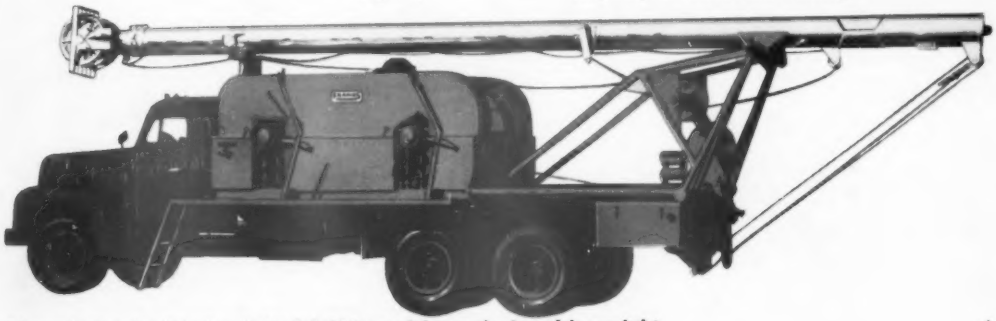
Packaged single or double drum truck-mounted, truck motor-driven, pole mast servicing unit.

ROCKET

Packaged single or double drum truck-mounted, truck motor-driven, telescoping derrick pulling and workover unit.

COMET

Packaged single or double drum trailer mounted telescoping derrick drilling and workover rig.



Above is Franks "Cruiser" Model 658 servicing unit. Legal in weight. Fastest rig up and down. Features Franks famous hoist, embodying the smoothest high capacity clutch yet developed; hydraulically adjusted and equalized brakes; Franks famous power take-off. Conservatively rated capacity for most economical hoisting is 7,500 feet, 2⅞" O.D. wet string tubing with rods.

All of Franks servicing units are now "packaged" to fit any standard truck of adequate capacity and can be installed in 12 to 36 hours. WRITE TODAY FOR A FREE COPY OF FRANKS NEW 1953 CATALOG, or see any Franks representative for full details.

FRANKS MANUFACTURING CORP.
Box 3218, Tulsa, Oklahoma

Canadian Representative: Oil Equipment Ltd., Calgary and Edmonton
Export Representative: A. V. Simonson, 149 Broadway, New York, N. Y.
Available through your favorite supply store.

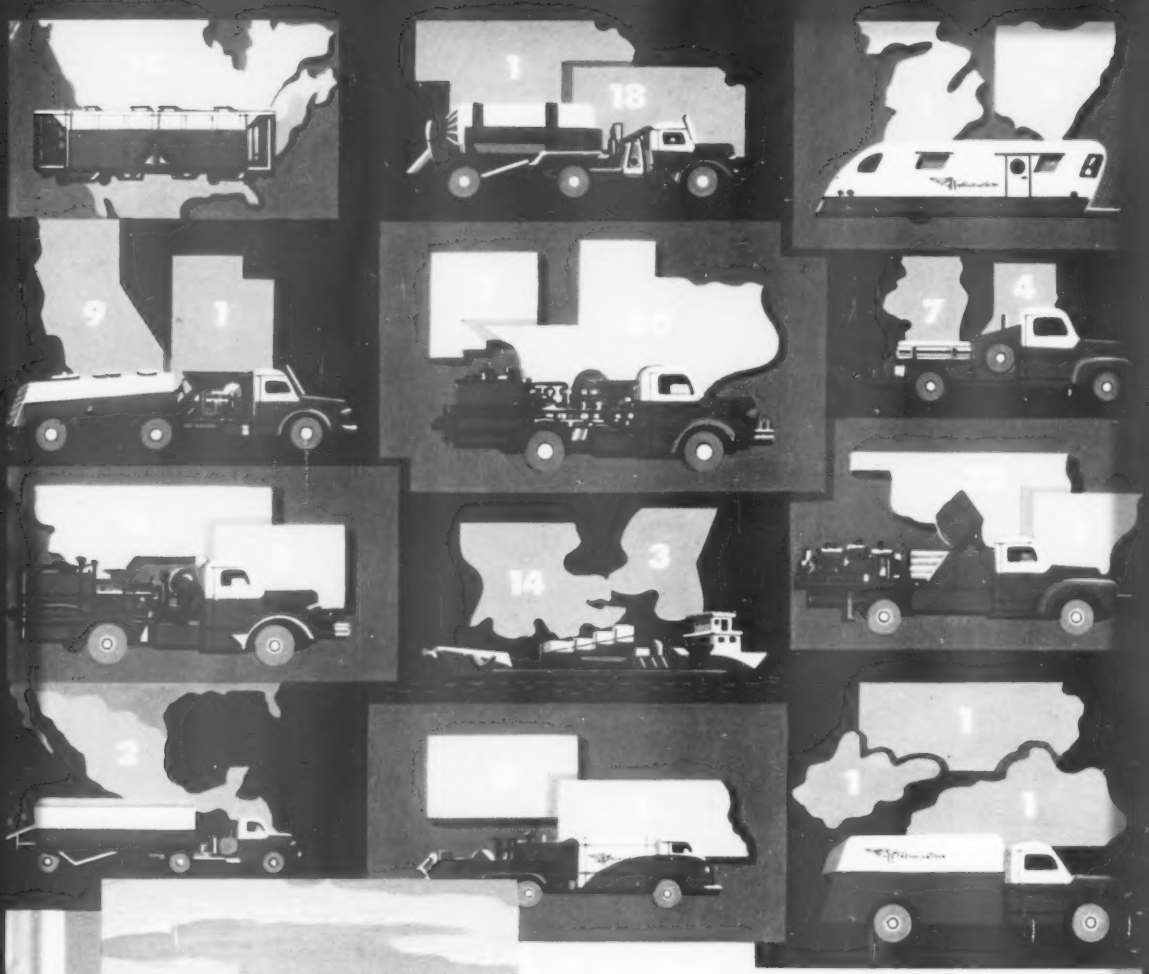
SEE FRANKS EXHIBIT AT PERMIAN BASIN OIL SHOW, ODESSA, OCTOBER 16-19

FRANKS MFG. CORP.
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

"on the SPOT" FIELD SERVICE

Available at Alice, Casper, Compton, Great Bend, Houston, Kilgore, Odessa, Seminole, and Tulsa with stocks of parts and factory trained personnel. Only Franks offers this complete service.

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 **SEPTEMBER 15, 1952**



201 CENTERS OF SERVICE

Pitched in the midst of almost every oil patch is a complete Halliburton field camp. It's the center of service to operators in the area... strongly manned by the most experienced engineers, fully equipped with the finest tools and technology, and pledged to perform the same quality of service that has made Halliburton first in its field.

201 centers of service in the United States, Canada, and Mexico put Halliburton only minutes away from you . . . well worth remembering for big savings of rigtime. Being handiest is only part of it, Halliburton's best in many ways. So, make it a habit to call Halliburton first.

"THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING"

HALLIBURTON

OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

THE OIL AND GAS
JOURNAL
Vol. 51, No. 19

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- Petrochem Report: Celanese Corp., Bishop, Tex.
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- Phillips New Rotary Rig Drills 8 Hours After Move Starts.
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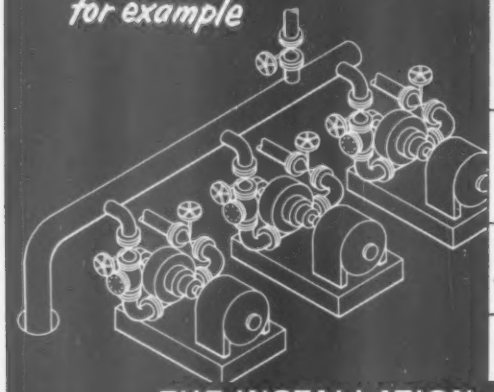
Can You Trust Your Checks to Hold Like This?

. . . on Water Pumps, for example



THE INSTALLATION

Crane Iron Body Swing Check Valves in 8-inch vertical lines on discharge side of water pumps supplying a large eastern paper mill.

VALVE SERVICE RATINGS

SUITABILITY:	Working smoothly - no complaints
FEATURES:	O.K. for either horizontal or upward flow
MAINTENANCE COST:	None - no maintenance needed to date
SERVICE LIFE:	Now better than other checks used
OPERATING RESULTS:	No water or head loss
PRICE:	In line with other makes
AVAILABILITY:	Stock item - Crane product

THE HISTORY

The mill depends on these pumps for all water. Loss of head at the pumps would create a serious problem. The mill could take no such risks. Regularly, the check valves on pumps were replaced, but only to be found leaking between pumping cycles, a few months later.

It's now more than a year since the change-over was made to Crane Check Valves. There's been no loss of water, no maintenance or replacement of any checks on the pumps. That was proof enough for the mill, that Crane Quality means better valves —greater dependability and bigger value. As a result, 3 more of these checks were installed on a separate battery of suction pumps.

THE VALVE

Crane No. 373, 125-Pound Iron Body Swing Check Valves, brass trimmed. The long life and high seating efficiency of these checks, in 2 to 8-in. sizes, is in large part due to the Crane patented flexible disc-hinge design. Double spring mounting eliminates lost motion between parts, yet permits true, full contact of disc and seat at every closure. Also serves to absorb the shock of seating under backflow pressure. See your Crane Catalog or Crane Representative for full details.

The Complete Crane Line Meets All Valve Needs. That's Why

More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois

Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

You get MORE CAPACITY with a FANMIX BURNER

Increase Boiler Ratings On Present Or Planned Equipment

In all types of Coppus-Dennis FANMIX Burners — straight gas or combination gas-oil — we utilize the energy of the fuel under pressure to drive the burner fan and deliver air in the proper proportion to the fuel flow. This exclusive "pinwheel action" *mechanically* mixes fuel and air in exactly the right proportions for truly radiant, non-luminous heat.

The result is uniform temperature everywhere in the combustion chamber — no drifting "hot spots" — and complete combustion under all conditions. That's why you can release more heat into your present furnace — why in new installations you get more heat into smaller furnace space.

FANMIX Saves On Both Old and New Installations

FANMIX can easily be operated with your present furnace and stack, requiring only minor changes in other equipment. Or if you're planning on new boilers, remember that FANMIX relieves the furnace from the burden of mixing, creates its own forced draft and takes smaller pipe sizes. Which means you can plan on reduced combustion space, less stack, no forced draft equipment and lower installation costs all around.

Get the Whole Story

Coppus engineers FANMIX Burners to meet individual requirements, providing complete control over heat pattern and combustion . . . Learn more about how "pinwheel action" can step up *your* boiler performance to peak efficiency and economy — as it is doing throughout industry. Send for Bulletin 410-6. Coppus Engineering Corp., Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" Products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, and MINING CATALOGS.

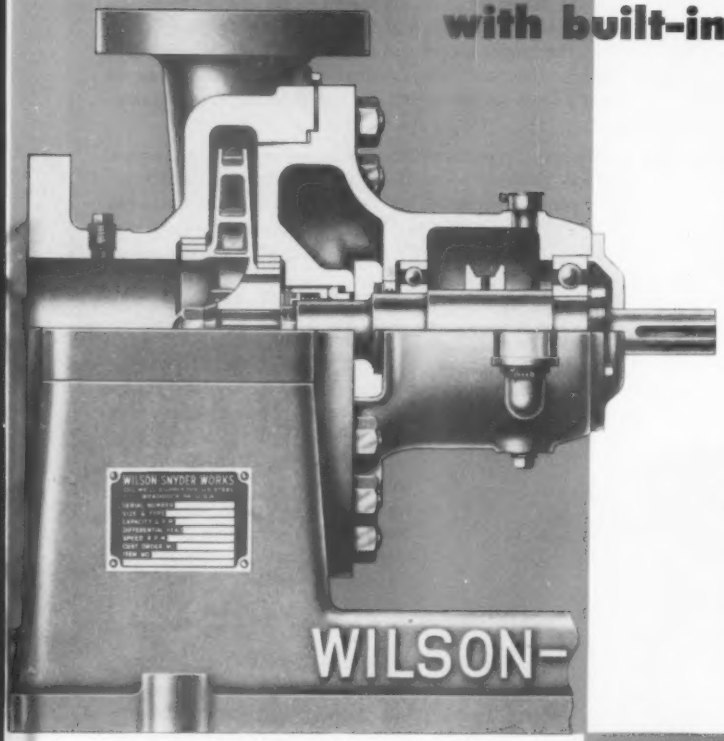
COPPUS ENGINEERING CORP.
270 Park Ave.
Worcester 2, Mass.
Please send Bulletin 410-6 to:
Name .....
Company .....
Address .....
City ..... Zone ..... State .....

The Oil and Gas Journal, published Mondays, copyright 1952, by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $4 yearly.

an addition to the line of Wilson-Snyder Pumps!

Type ESC PROCESS CENTRIFUGALS

with built-in mechanical seal



9 sizes from

- 15 to 1200 GPM Capacity
- 40 to 470 Feet Head
- Subzero to 250° Fahrenheit
- 15 to 750 p.s.i. Discharge
- 2 to 100 Horsepower

Type ESC horizontal, single-stage centerline supported centrifugal pumps with vertically-split case are heavy-duty pumps specifically designed for a mechanical seal. They have a spacer-type coupling and sloping-top drain base plate. At minimum cost, they provide rugged, dependable, and fool-proof construction for continuous and efficient operation.

1. Built-in balanced mechanical seal eliminates gland, packing, sleeve, and set screws. Only one seal size is used for all pump sizes.

2. Short overhang of impeller reduces shaft deflection, vibration, and length of pump.

3. Large streamlined impeller eye results in low NPSH requirements.

4. Parts are highly interchangeable between all sizes, minimizing inventory.

5. Wearing parts can be replaced without disturbing case, piping, or driver.

6. Extra strong case and bearing bracket design assure true alignment and smooth operation.

7. Wear rings on both sides of impeller minimize thrust and stuffing box pressure.

FOR FULL INFORMATION . . . or quotations on Wilson-Snyder Process Pumps, contact "Oilwell's" Refinery Specialist at Area Office points shown below, or Wilson-Snyder Works, Braddock, Pennsylvania

OIL WELL SUPPLY
DIVISION
UNITED STATES STEEL COMPANY

Executive Office—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Area Offices — CALGARY, CANA
CASPER, WYOMING . . . COLUMBUS,
DALLAS, TEXAS . . . HOUSTON, TEX
TULSA, OKLA. . . . LOS ANGELES, CALI

Branches Serving All Oil Fields

USS TRADE MARK

"OILWELL"

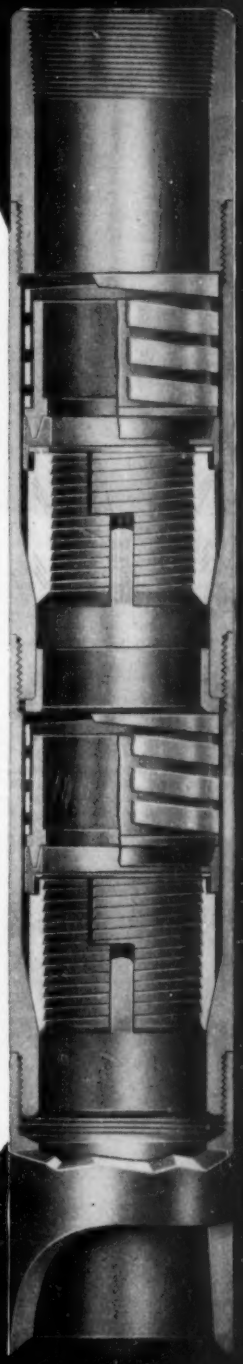
TRADE MARK

UNITED STATES STEEL

You Know You Have Good

HOLE INSURANCE

with this American Iron Releasing & Circulating Overshot on your derrick floor!



IT PAYS to keep this all-purpose fishing tool and its accessories handy on your derrick floor. It keeps you prepared for any fishing job — ready when it needs to be done! That's why we say it's good "hole insurance"! It eliminates costly delays by making it possible for you to get a fishing job under way and completed in double-quick time. Then you're back to making hole — with a minimum amount of costly delay!

GO "AMERICAN" ALL THE WAY

with these American Iron fishing tools!

Wall Hook

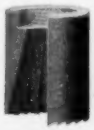
Type H Sub

MANY HOURS of costly fishing time have been saved by the use of these American Iron Fishing Tools! You can always depend on them to meet the most rugged demands of any fishing job! For further details, see your Composite Catalog; or call us, now!

Straight Rotary Taper Taps

Type G Sub

Overshot Oversize Guides



Overshot Milling Shoes

AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF OIL FIELD EQUIPMENT
A
OKLAHOMA CITY U.S.A.

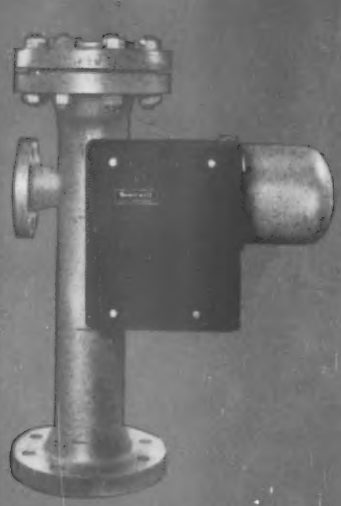
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

AMERICAN IRON & MACHINE WORKS CO.

OKLAHOMA CITY, OKLAHOMA • BOX 1177 • PHONE L. D. 518
DISTRICT OFFICE: HOUSTON, TEXAS
EXPORT OFFICE: 11 WEST 42ND ST., NEW YORK CITY, N. Y.

MANUFACTURERS OF DRILLING EQUIPMENT • PRODUCTION EQUIPMENT • PUMP SPECIALTIES • FISHING TOOLS

Safer, more *through*



FOR DETECTING BATCH CHANGES

Displacement Type Transmitter: A simple, economical method for determining changes in pipeline product is provided by the Honeywell displacement type transmitter. It operates in conjunction with a displacer chamber through which a sample of piped product passes . . . detects changes in specific gravity by measuring the buoyancy of the displacer . . . and transmits a pneumatic pressure signal to a Brown recorder.

Single Pilot Dual Controller: Maximum safe pipeline throughput is automatically maintained by means of a Single Pilot Dual Pressure Controller which simultaneously regulates *both* the suction and discharge pressures of the pumping station. This instrument records both pressures, and throttles flow only when suction pressure falls below a minimum or when discharge pressure rises above a maximum value.

FOR REGULATING PUMPING PRESSURES

***ElectroniK* Temperature Recorder:** Overheat failures of motor windings, motor and pump bearings, pump glands and casings, can be avoided by checking temperatures automatically with a multi-record *ElectroniK* temperature recorder. This instrument logs as many as 16 temperatures on its 11-inch wide strip chart, and automatically actuates alarms whenever safe limits are exceeded. As many as 8 different alarm settings can be provided.

FOR OVERHEAT PROTECTION

Brown Differential Converter: For pipeline flow measurements, the Brown Differential Converter offers many specific advantages. It is accurate and sturdy . . . utilizes a pneumatic-balance that eliminates mercury, seals and strainers. It converts the pressure differential at the metering orifice into a proportionate air output pressure for transmission to a remote flow meter.

FOR MEASURING FLOW

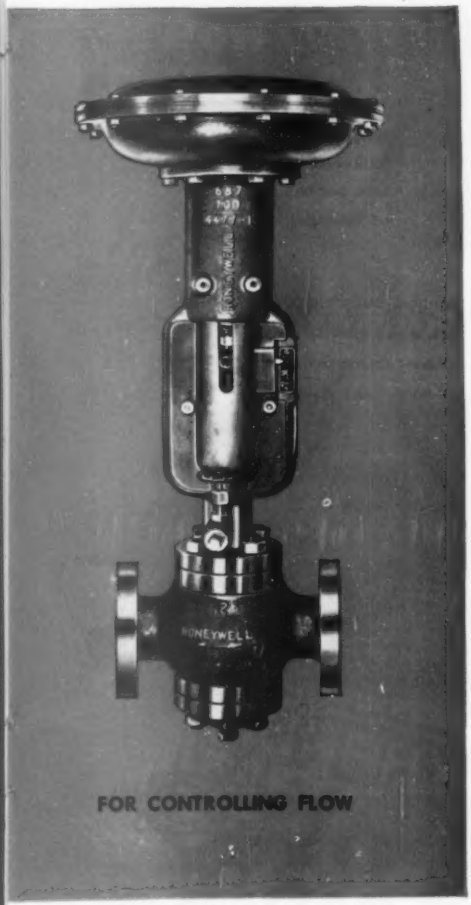
● *Important Reference Data*

Write for reprint of article,

. . . and for specific literature on

efficient pipeline operation...

Honeywell instrumentation



Series 700 Valves: Every feature needed for pipeline service is built into these valves . . . assuring you the best in sensitivity, and ruggedness. Available in single seated, double-seated, three-way and other types in a variety of sizes and variations.

Maximum rates of throughput, greater safety . . . these are the principal benefits that pipeline men are realizing by applying Honeywell instruments and controls. These men are relying on modern methods of measurement and control to watch over critical variables with speed, dependability and accuracy that can't be matched by human hands.

Of particular interest in pipeline operation are Honeywell instruments for regulating pumping pressures, for measuring critical temperatures, for metering flow, for detecting changes in piped fluids, and for controlling flow. All are standard, industry-proved products, available in a choice of ranges and models to suit any application requirements. And all are backed by a nationwide service organization.

Plan now to utilize these advanced techniques for smoother, safer supervision of pumping stations. Our local engineering representative will welcome the opportunity to discuss your applications. Call him today . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4488 Wayne Ave., Philadelphia 44, Penna.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS

First in Controls

"Control of Pipeline Booster Stations"
any of the products illustrated above.

LESS BLOCK HEIGHT · MORE MAST HEIGHT

with the GUIBERSON

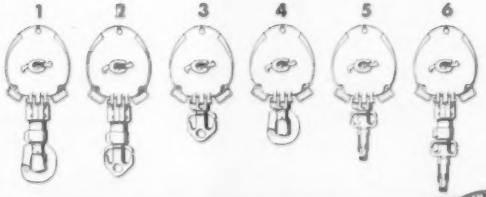
UNITIZED

Tubing Block and Hook

You add extra working height to your rig when you use the compact, streamlined 45-ton Guiberson Type "A" Unitized Block and Hook—an assembly that has more work-saving features packed into less over-all height than any other tubing block made.

- Maximum height with any hook assembly 60 inches
- Finest bearings—falls fast, won't foul up
- Lines reeve into block without disconnecting hook
- "Safety link" latches into hook, can't disengage
- Smooth, streamlined design—3 to 1 safety factor on yield

ONE *compact block* — SIX *interchangeable hook assemblies* *in SINGLE or DOUBLE SHEAVE*

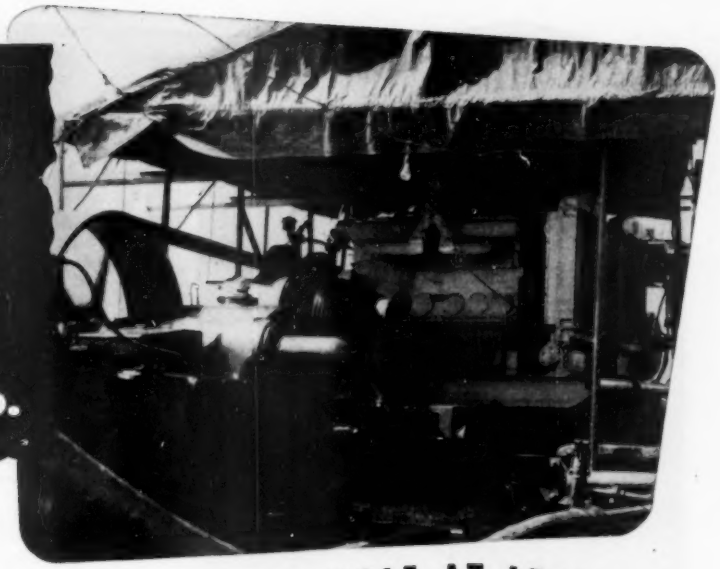


1 Block and Spring Hook Assembly
2 Block and Spring Duplex Hook Assembly
3 Block and Short Duplex Hook Assembly
4 Block and Short Hook Assembly
5 Block and Short Triplex Hook Assembly
6 Block and Spring Triplex Hook Assembly

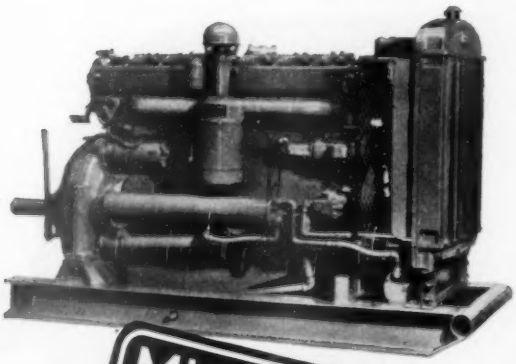
Better Be Safe Than Sorry!

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Sold by Leading Oil Field Supply Stores Everywhere

It's MURPHY DIESEL POWER for Powell Drilling Co.



THE BEST WAY TO MAKE MORE HOLE AT LESS COST



MURPHY DIESEL

Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.

242

WITH drilling costs rising steadily, the economy, dependability and long life of Murphy Diesels is more important than ever before. For any given job, the heavy duty Murphy Diesel uses less fuel per horsepower hour, runs longer between overhauls and lasts longer than any other engine of comparable size. A broad statement? Yes, but it's backed up by actual performance records in the field. For you, it all adds up to more hole at less cost.

That's the reason Powell Drilling Co. recently installed two Murphy Diesels each rated at 165 H.P. continuous, 180 H.P. intermittent on their Emsco GB-350 rig. The engines also power a Gardner-Denver 7¼"x14" mud pump. When the photograph above was made, the rig was working in Trego County, Kansas.

If you want to reduce your drilling costs, call your Murphy Diesel Dealer. He'll show you how you can do it with Murphy Diesel power.

MURPHY DIESEL COMPANY
5305 W. Burnham St., Milwaukee 14, Wisconsin
Tulsa Office—Sales, Parts and Service:
113-117 South Elwood Street, Tulsa, Oklahoma
Sales, Parts, Service

See Your Murphy Diesel Dealer

LOS ANGELES, CALIFORNIA
Industrial Engine Service

SAN ANTONIO, TEXAS
J. E. Ingram Equipment Co.

EVANSVILLE, INDIANA
Pershing Equipment Co.

AMARILLO, TEXAS
Service & Supply

EDMONTON, ALBERTA, CANADA
Northern Engine & Equip. Co., Ltd.

JACKSON, MICHIGAN
Utility & Industrial Supply

DALLAS & LUBBOCK, TEXAS
Conley-Lott-Nichols Mach. Co.

HOUSTON, TEXAS
Houston Engine & Pump Co., Inc.

MT. VERNON, ILLINOIS
Ed. Mayer Tractor Co.

GREAT BEND, KANSAS
Manufacturers Dist. Co.

This completely Bonderized® enclosure, more than a match for the severest weather conditions, houses:

1. Life-Linestarter . . . provides dependable control and accurate overload protection.
2. AB Circuit Breaker . . . assures positive, tamper-proof circuit protection.
3. Lightning arrester . . . protects both starter and pumping motor.
4. Time switch . . . converts control to automatic operation for cycle pumping.

This rugged Life-Line motor, power-packed for the toughest jobs, has:

1. Steel frame, bracket and feet . . . withstand the many severe shocks imposed on pumping operations.
2. Pre-lubricated bearings . . . need no further lubrication. Eliminate bearing failure from faulty lubrication.
3. Dynamically balanced rotor . . . assures maximum freedom from vibration. Gives quiet operation.
4. "Pear-shaped" lamination slots . . . allow coils to be slipped in place tightly without forcing. Leave no unfilled spaces to gather dirt.

WHAT *Life-Lines* REALLY DELIVER IS MORE SERVICE . . . LESS SERVICING

Whatever the weather... Wherever the job

this pair assures pumping efficiency

Weather offers no challenge to the efficiency of Westinghouse Oil Well Pumping Motors and Controls. Specially designed for outdoor pumping service, they shrug off attacks of snow, rain, dust and dirt. Life-Line motors have an outer hood which gives extra weather protection at less cost than totally-enclosed types. And the controls—AB Circuit Breaker and Life-Linestarter—are combined in one rugged, weatherproof, lightning-protected enclosure suitable for pole mounting.

What's more, this protected pair has the stamina to stand up under the demands of continuous pumping duty. They require minimum attention.

The Life-Linestarter provides accurate overload protection. It's advanced in design. Has only one moving element. Nothing to stick or jam. No chance of false operation from vibrations, jars or accidental blows. Where cycle pumping is required, the built-in switch handles the "ON" and "OFF" operations automatically. Means the pumper's periodic trips to the well for manual switching become a thing of the past.

As for the rugged Life-Line motor, it's made to take it! Has steel frame, bracket and feet that can stand the severe service encountered in oil well pumping. Pre-lubricated motor bearings need no lubrication . . . eliminate down time.

Assign this Westinghouse pair to your pumping operation. Gain the dependable service they deliver! Your Westinghouse representative will gladly give you a copy of the "Petroleum Book", B-5444. Or you may write, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21714

YOU CAN BE SURE...IF IT'S

Westinghouse

Life-Line

MOTORS and CONTROLS

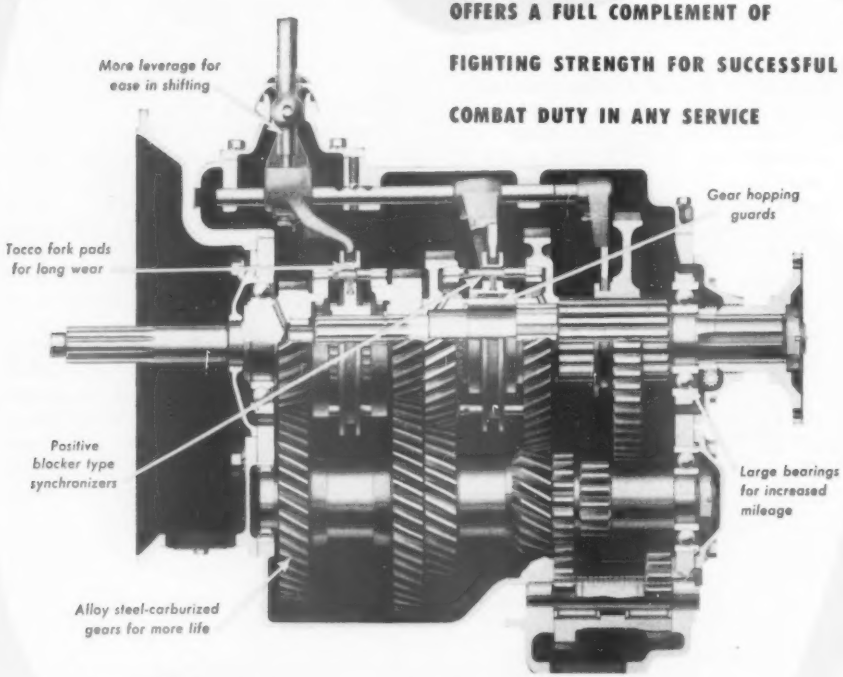
Spicer

SPECIALISTS IN SERVICE

Equal shifts for driver convenience

The Spicer Brown-Lipe Fully-Synchronized Transmission

OFFERS A FULL COMPLEMENT OF FIGHTING STRENGTH FOR SUCCESSFUL COMBAT DUTY IN ANY SERVICE


More leverage for ease in shifting
Gear hopping guards
Tocco fork pads for long wear
Positive blocker type synchronizers
Large bearings for increased mileage
Alloy steel-carburized gears for more life

40 YEARS OF Spicer SERVICE

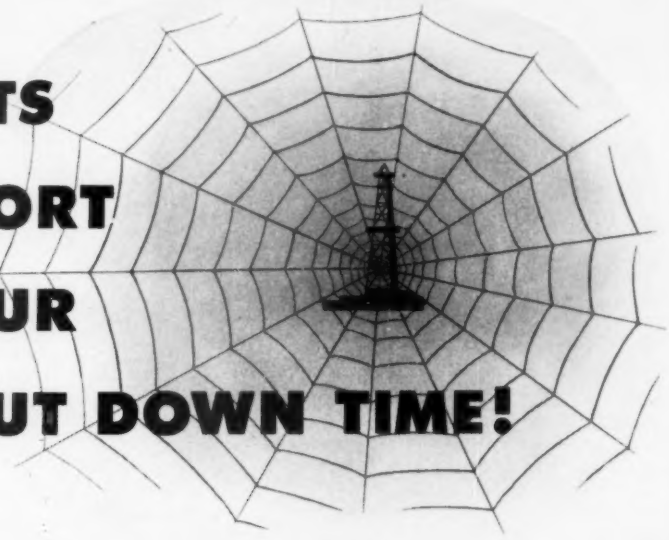
SPICER MANUFACTURING

Division of Dana Corporation • TOLEDO 1, OHIO

TRANSMISSIONS • UNIVERSAL JOINTS • BROWN-LIPE AND AUBURN CLUTCHES • FORGINGS • PASSENGER CAR AXLES • STAMPINGS • SPICER "BROWN-LIPE" GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES

HALLIBURTON'S RETRIEVABLE CEMENTER

CUTS SHORT YOUR SHUT DOWN TIME!



High speed operation with a big saving in rigtime is yours with this versatile Halliburton tool! Just run it in on drill pipe or tubing with no surfacing between prelocated squeeze points.

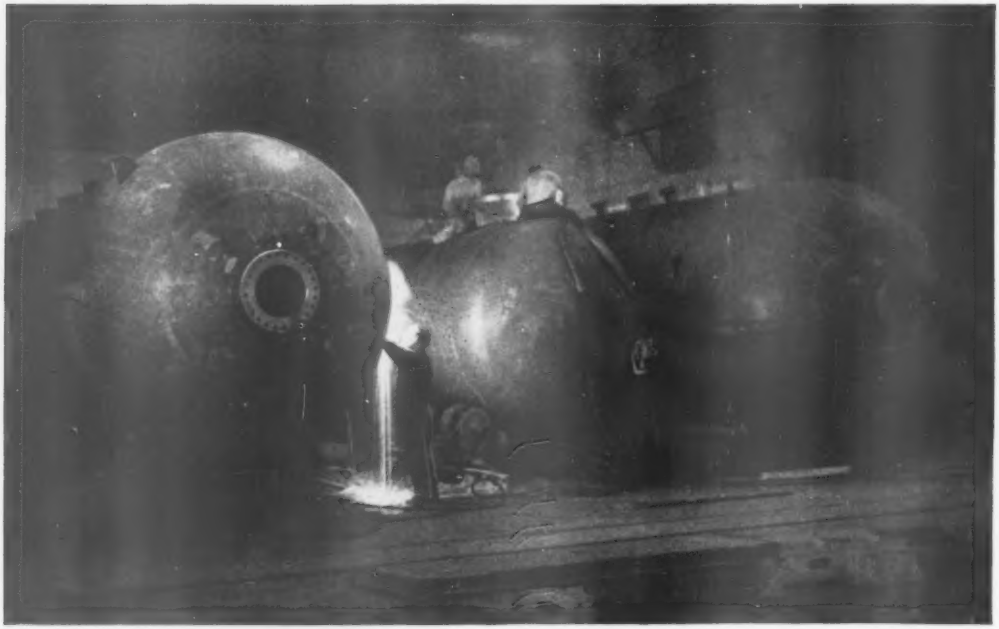
Usually out of the hole in one trip within an hour after cement is placed, the Halliburton Retrievable Cementer reduces waiting time for cement to set and eliminates time necessary to drill out drillable packers.

SIMPLICITY AND PRECISION ENGINEERING ASSURE BETTER PERFORMANCE. An equalizing valve speeds the run in. Circulation valve ports are closed by simply picking up on the tubing or drill pipe a few feet. The rugged slip-body of drillable materials is equipped with a series of slips actuated by pressure within the tubing or drill pipe. Two specially designed packing cups mounted on a mandrel below the slip body provide an effective pressure seal. The slips are automatically recessed by releasing pressure from the tubing.

GET THE ADVANTAGE OF EXPERIENCE! Get the Retrievable Cementer designed and built by the world's most experienced cementers. Let your nearby Halliburton representative show you how fast and economical precision squeeze cementing can be. Or write Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

YEARS AHEAD IN SQUEEZE CEMENTING



An excellent example of Graver's skill in fabricating pressure vessels is this 10′ x 32′ desalting tank for use in a new refinery unit now under construction. The tank was built for an operating pressure of 300 psi.

Something Special

IN PRESSURE VESSELS

The steady growth of the petroleum, petro-chemical and chemical industries has greatly increased the demand for specialized equipment, particularly new types of pressure vessels.

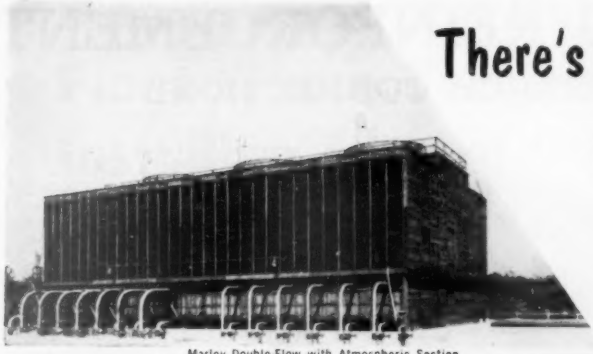
Graver's production facilities and skilled craftsmanship have provided the answer to pressure vessel problems for many years. Every Graver-built pressure vessel is fabricated in accordance with the ASME Code for unfired pressure vessels, the API-ASME Code as adapted to the special requirements of the petroleum industry, or to the even more stringent requirements set by customers. Complete X-raying, stress relieving and equipment for rigid inspection are additional features which assure that every fabrication will measure up to the requirements expected of it.

Whether fabricated in steels, clads or alloys, every pressure vessel bearing the Graver nameplate bears the symbol of quality.

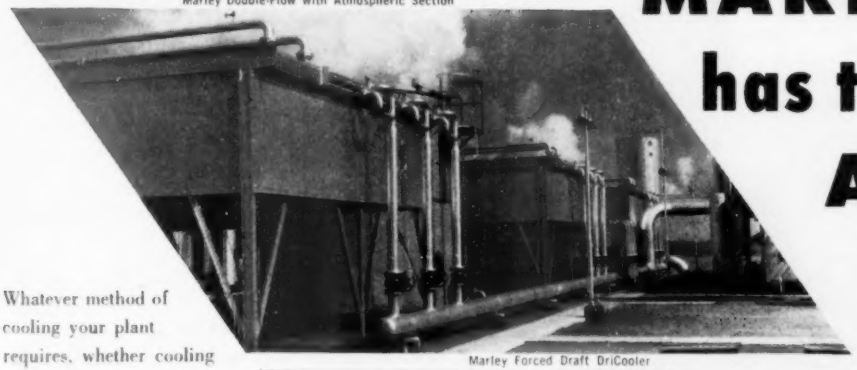
GRAVER TANK & MFG. CO., INC.
EAST CHICAGO, INDIANA
NEW YORK • CHICAGO • PHILADELPHIA • DETROIT • WASHINGTON
CINCINNATI • CATASAUQUA, PA. • HOUSTON • SAND SPRINGS, OKLA.

GRAVER

There's More Than One Way to Cool Engines . . . and MARLEY has them ALL!



Marley Double-Flow with Atmospheric Section

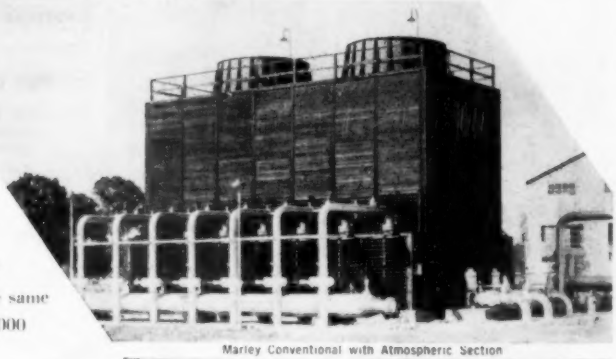


Marley Forced Draft DriCooler

Whatever method of cooling your plant requires, whether cooling medium be air or water, you'll find the finest equipment in the complete Marley line.

Marley Dri-Coolers are increasingly popular as more and more plants utilize air cooled heat exchange. The flexibility of header design and finned tube arrangement makes Dri-Coolers ideal for cooling of jacket water and lube oil and other high level cooling, either singly or both in the same unit. They now serve plants from 50 hp to 23,000 hp, in many countries and climates.

For water cooling, Marley has long set the standard. Marley patented Double-Flow, Conventional induced draft and atmospheric towers are all adaptable for indirect cooling through standard Marley atmospheric sections. Marley towers and sections are completely integrated units and the range of sizes fits every requirement of any size plant.



Marley Conventional with Atmospheric Section

Natural Draft with Atmospheric Section

PRECOOLING AIR is another function of Marley cooling towers. In a single installation 40 Marley Aquatowers are in this type service.

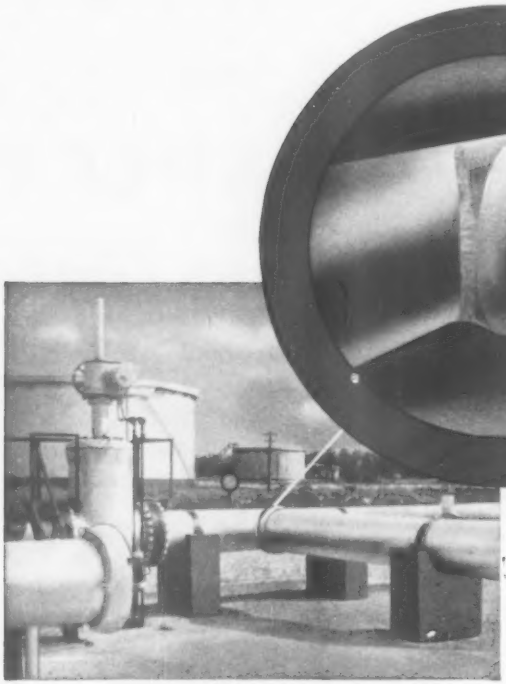
MARLEY

The Marley Company Inc.

Kansas City 5, Missouri

ENGINEERED REINFORCEMENT

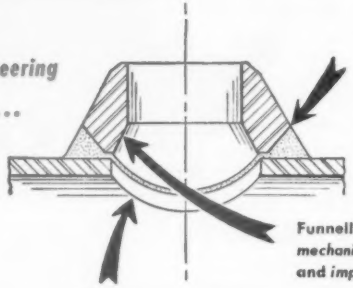
FOR YOUR BRANCH CONNECTIONS



Does your operation require a mechanical as well as a pressure member in branch construction? WeldOlet Welding Fittings are engineered to provide BOTH properties.

A big portion of your engineering job is done for you, if you...

Specify Bonney WeldOlet Welding Fittings to Insure Permanent Strength



Reinforcement where both the mechanical and internal *stresses are most severe*

Funnelled to relieve *mechanical stress concentrations and improve fluid flow*

Shaped and beveled for *clean, quick and economical installation*

FOR COMPLETE ENGINEERING DATA WRITE FOR YOUR BONNEY W3 WELDOLET CATALOG

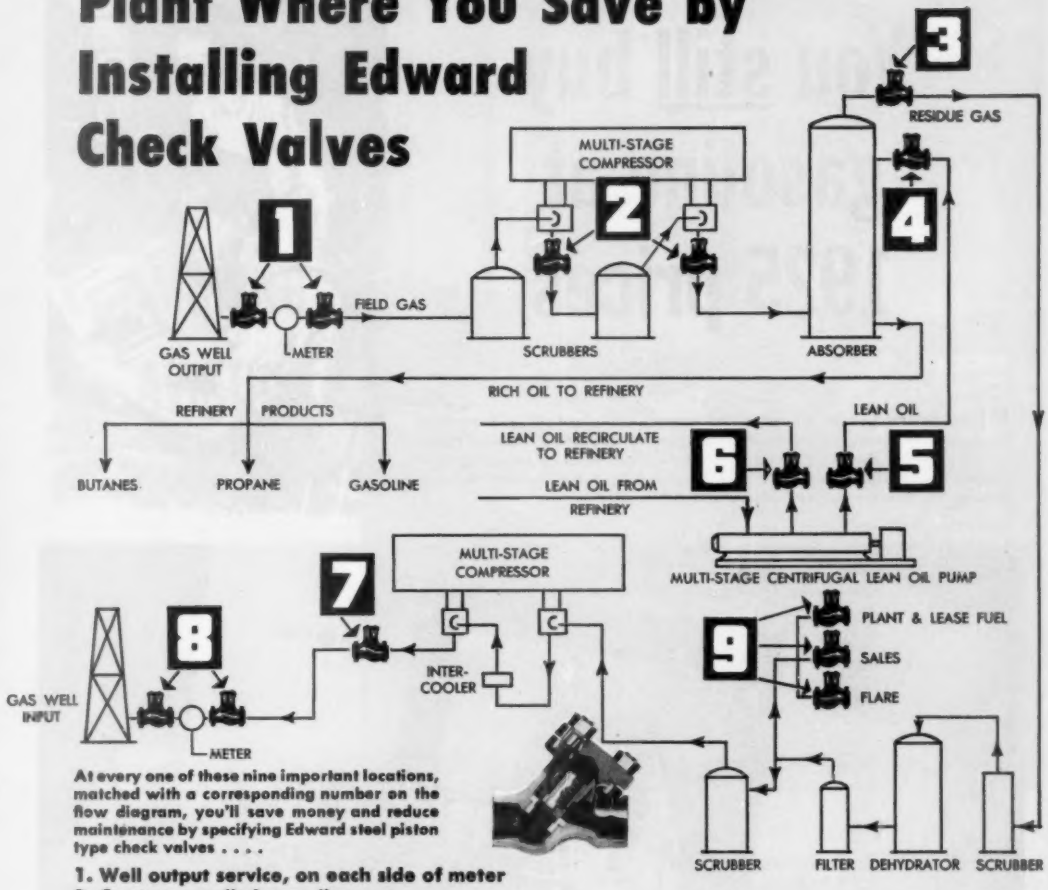
WELDING FITTINGS DIVISION

BONNEY FORGE & TOOL WORKS

ENG. DEPT., 366 GREEN STREET

ALLENTOWN, PENNSYLVANIA

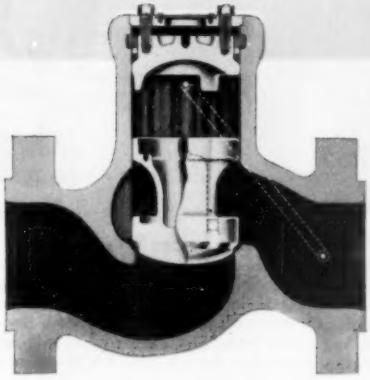
9 Key Points in a Natural Gasoline Plant Where You Save by Installing Edward Check Valves



At every one of these nine important locations, matched with a corresponding number on the flow diagram, you'll save money and reduce maintenance by specifying Edward steel piston type check valves . . . .

1. **Well output service, on each side of meter**
2. **Compressor discharge lines**
3. **Residue gas outlet from absorber**
4. **Lean oil to absorber**
5. **Lean oil pump discharge**
6. **Lean oil pump discharge recirculation to reabsorber in refinery**
7. **Compressor discharge of gas returning to field**
8. **Well input service, on each side of meter**
9. **Stripped or residue gas for internal use, sales to gas companies, or flare**

For any size line in a gasoline plant, for any pressures up to 6000 lb WOG, there's an Edward piston type check valve available. All-steel construction, with stainless steel or Stellite seats and disks. Integral body guide ribs and guide lip on disk centers it tightly on seat. No pipe-jarring slam when the valve closes. With or without piston rings, as the service requires. Full size range in all types of end connections. Write for literature.



Edward Valves, Inc.

Subsidiary of ROCKWELL MANUFACTURING COMPANY

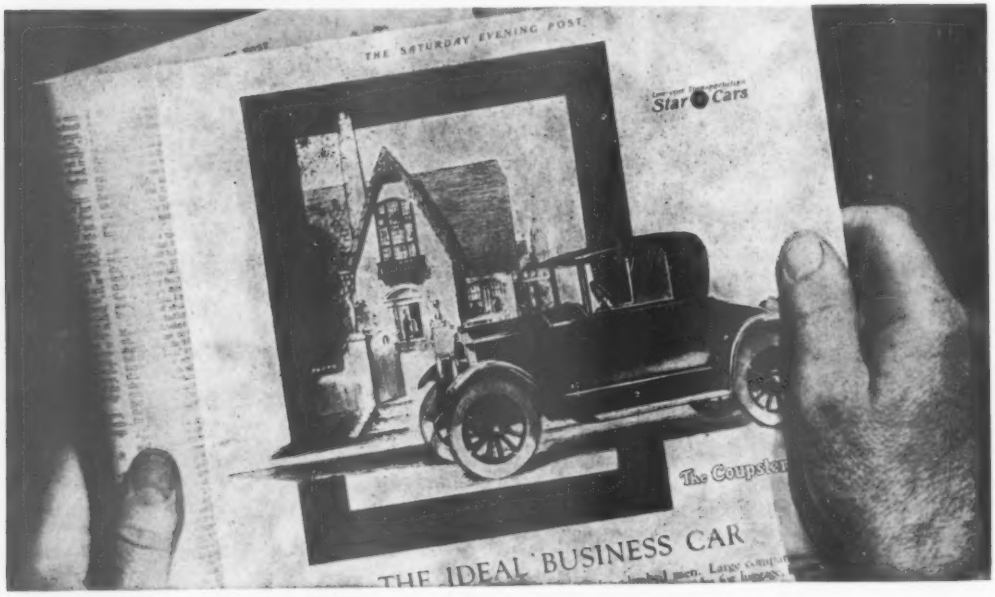
EAST CHICAGO, INDIANA

1492 West 145th Street

Another Product

You still buy gasoline at 1925 prices

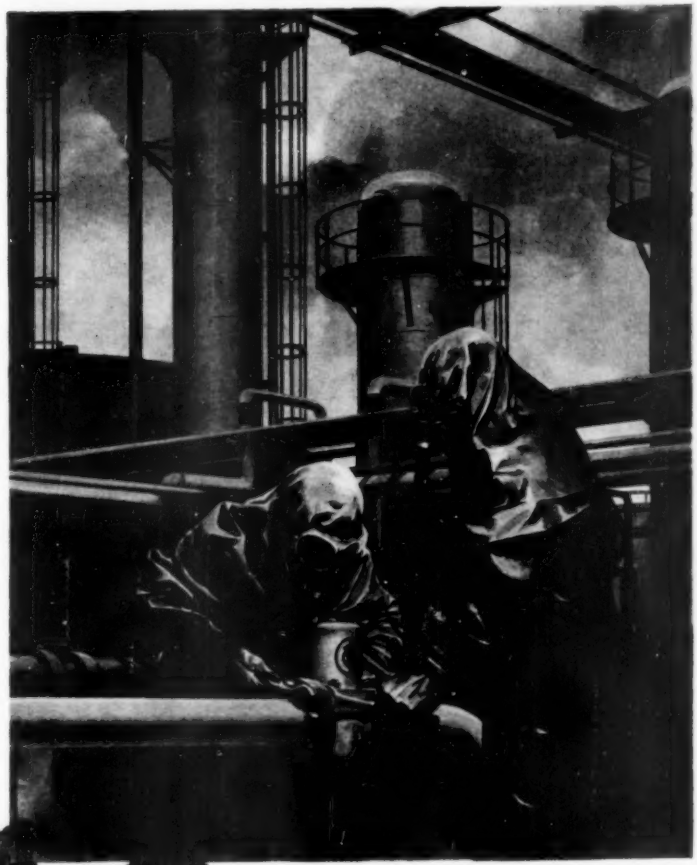
If you were to take a sentimental journey back into the mid-twenties by thumbing through a stack of old magazines, you'd find the page below in the *Saturday Evening Post* issue of July 4, 1925. Remember the square-topped cars of those days . . . with their flat windshields, wide running boards, big wooden steering wheels and soft tops?



Remember the prices? Things were a lot cheaper than they are now when almost everything you buy is 'way up in price . . . except gasoline. ¶ Actually, gasoline costs almost exactly the same today—aside from taxes—as it did when the beauty above was an exciting new automobile. ¶ And it's far better gasoline, too. Two gallons today do the work that required three in 1925. ¶ Few industries can match this record. It was made possible by two things: intense competition among oil companies and a steadily increasing efficiency of production. ¶ In the last five years alone, Standard has put more than $644,000,000 into facilities—and another $35,000,000 into technical service and research. This investment helps us make certain that gasoline continues to be one of the best buys in your family budget.

STANDARD OIL COMPANY OF CALIFORNIA ***plans ahead to serve you better***

WHAT! MAKING AVIATION HISTORY?



Not as spectacularly as the Wright Brothers, La Coste, or Lindbergh, but Cameron has helped make aviation history, too. When the need for aviation gasoline became critical during the war, and again in the last year or two, alkylation units sprang up almost overnight. With them came the need for valves to handle the corrosive catalysts—hydrofluoric and sulfuric acid. The Cameron Non-Lubricated Lift-Plug Valve was designed specifically for that service. Test installations quickly proved that the lift-turn-reseat principle of this valve, which requires no lubricant, together with its separate, renewable seat which permits any desired trim to resist corrosion, was ideal for alkylation service. The advantages of this remarkable valve have since been recognized by all divisions of the petroleum, chemical, and process industries.

Why not profit by this *years ahead* design in your operations?

World Leader in Pressure Control

C. I. W., Inc., P. O. Box 1212, Houston, Texas
Export: 7912 Empire State Bldg., New York, N. Y.

Cameron

IRON WORKS
INCORPORATED

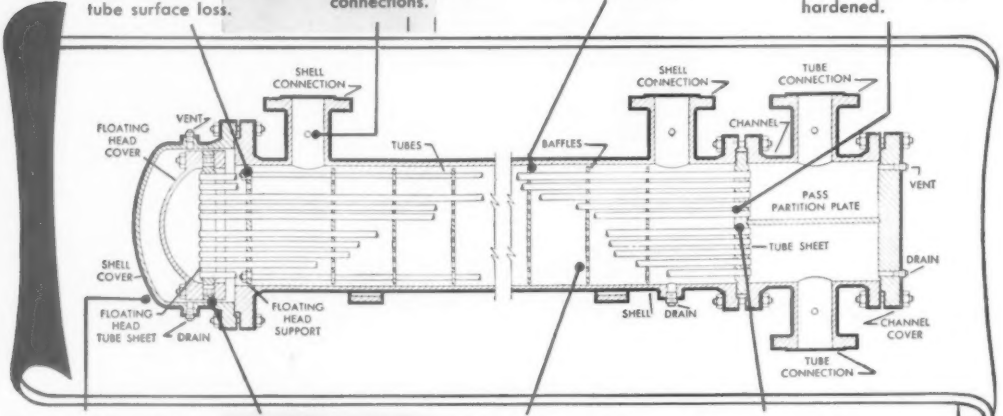
HEAT EXCHANGER EFFICIENCY starts with SUPERIOR DESIGN

"Do-Nut" shape support plate offers maximum support to the floating head without undue strain on the tubes, and tube surface loss.

Connection for pressure gauge and thermometer provided on all flanged connections.

Baffles — cross flow segmental type machine cut and drilled. Close tolerances assure maximum heat transfer.

Tubes — expanded into tube sheets by means of electronic controlled roller expanders, tubes cannot be over expanded or work hardened.



Removable shell cover for easy access to floating head.

"Knock-down" Type floating head. Use of floating head minimizes thermal expansion strains.

All baffles exactly spaced and solidly bolted together with heavy tie rods and spacers.

Ample thickness tube sheet to prevent undue deflection at pass partition plate.

The features of design which make a heat exchanger *good* are the features which contribute most to efficient, long-lived, trouble-free performance *under your operating conditions*. Since operating conditions are seldom exactly duplicated, industrial heat exchangers are usually custom-built . . . and design characteristics are different for each application.

But while design characteristics differ, the fundamentals of good heat exchanger construction never change. If you are considering the purchase of heat exchanger equipment, we welcome the opportunity of showing you how SUPERIOR Heat Exchangers combine tested fundamentals with design features that fit your use . . . for performance you can BANK on.

Write for your copy of catalog 520

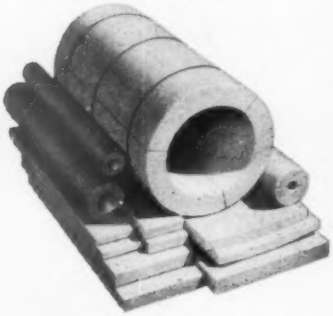
for performance you can **BANK** *on*

SUPERIOR HEAT EXCHANGERS

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 18, N.Y.

NEW GASOLINE PROCESSING PLANT, Ringwood, Oklahoma is insulated throughout with Kaylo Heat Insulation. Co-owners: Warren Petroleum Co. and Oklahoma Natural Gas Co. General Contractor: Gasoline Plant Construction Co., Houston, Texas.

Leading Industries Are Switching to KAYLO HEAT INSULATION



Kaylo Heat Insulation offers an outstanding combination of advantages—in *both* performance and application.

With its *effective* temperature range—up to 1200° F . . . plus an unmatched selection of sizes and shapes and Simplified Dimensional Standards that allow nesting, Kaylo Heat Insulation reduces the number of pieces required per job.

Kaylo Heat Insulation is hydrous calcium silicate, *not glass.* It is insoluble in water, incombustible and exceptionally lightweight—yet strong. Breakage is almost negligible. Easily cut and fitted, it is installed with standard tools.

You'll find that your jobs can be done better with Kaylo Heat Insulation. Get *all* the facts about its advantages.

WRITE FOR FREE BOOK—"Kaylo Heat Insulation." Address: Dept. N-234, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

KAYLO® ... *first in calcium silicate*

... *pioneered by* OWENS-ILLINOIS **Glass Company**

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Here's how Power System Planning pays off for Plantation Pipeline

When Plantation's line was first built in 1941, Westinghouse worked with them in planning the electrical control system. So many of the ideas paid off in lower maintenance, system flexibility and reduced power costs that the new expansion program incorporates many of these ideas along with some new ones developed between our engineers and theirs. Here are a few of the outstanding features.

Use little more power despite doubled capacity

The new parallel line doubles system capacity but power requirements have increased only slightly. One important way this was done was by preventing extra charges for peak power loads. When the load reaches the upper limit, a flow-control valve automatically cuts it back.

Highly mechanized system

Another feature was the use of automatic controls wherever possible. As a result, the big expansion increased man power needs very little. For example, if abnormally high pressures or temperatures should develop, special equipment automatically shuts down the pumps or sounds a warning.

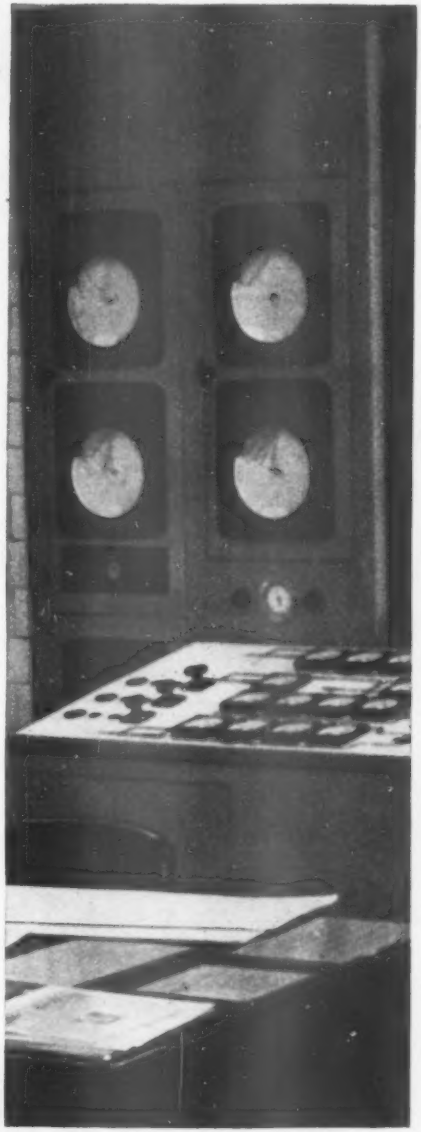
Radically new instrumentation system

Westinghouse engineers also helped develop a new instrumentation system for the pumping stations. This system using electrical strain gauges permits the use of standard electrical instruments to show pressure. This eliminates the disadvantages of pressure tubing, with its hazards of high-pressure leaks. It also simplifies instrument mounting and permits a simplified compact control board for system operation. These instruments are also more accurate than conventional gauges.

Call Westinghouse early on YOUR next project

This is a good example of the kind of thinking we can apply to *all* petroleum industry projects. When your next job comes up, call in Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Penna.

J-94907



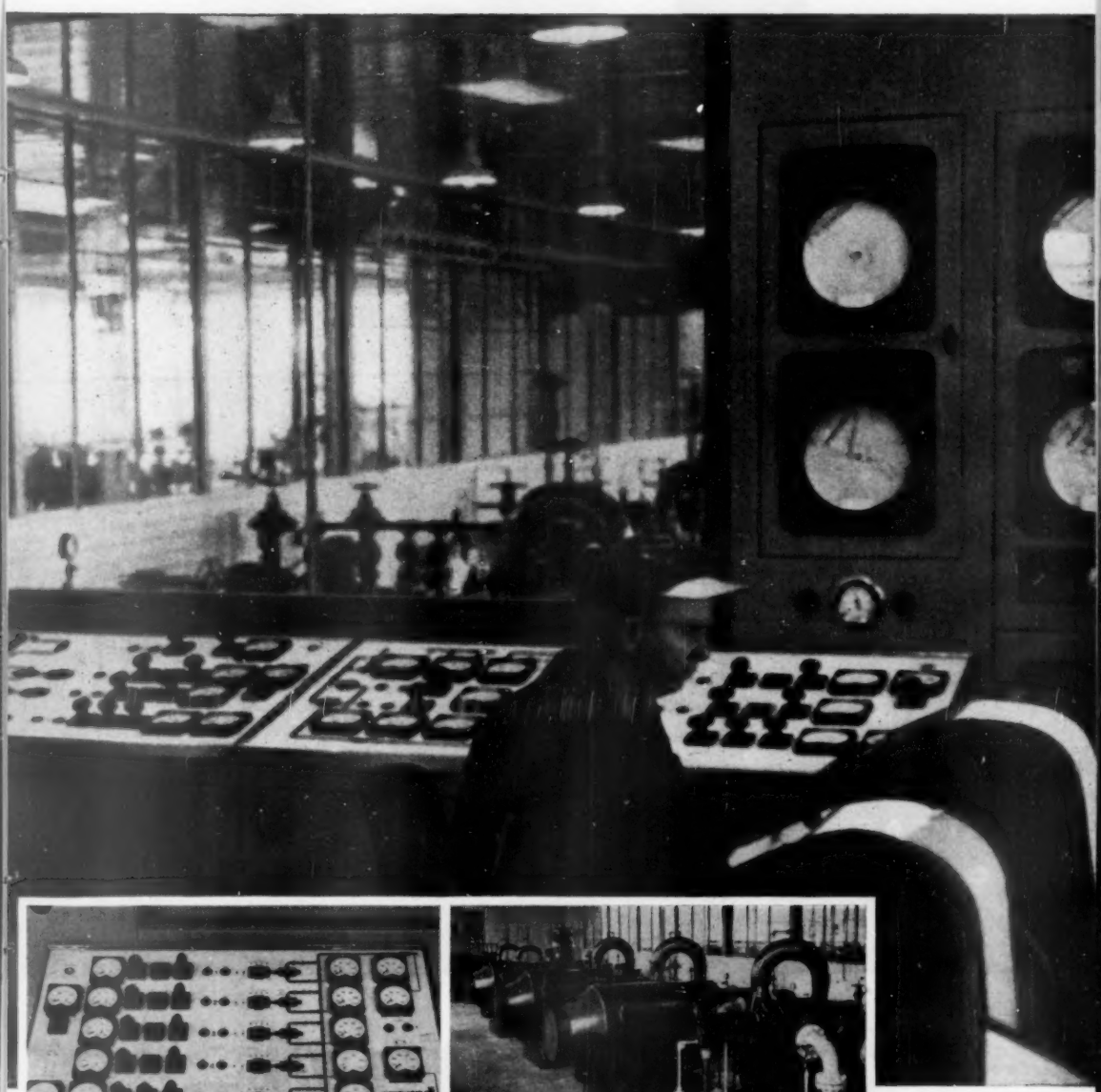
YOU CAN BE SURE...IF IT'S

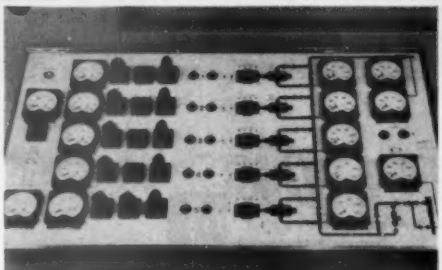
Westinghouse

EQUIPMENT FOR THE PETROLEUM INDUSTRY

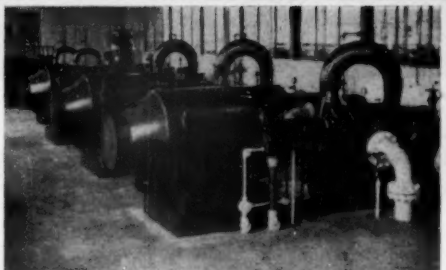
WESTINGHOUSE

They did what you can do to produce more



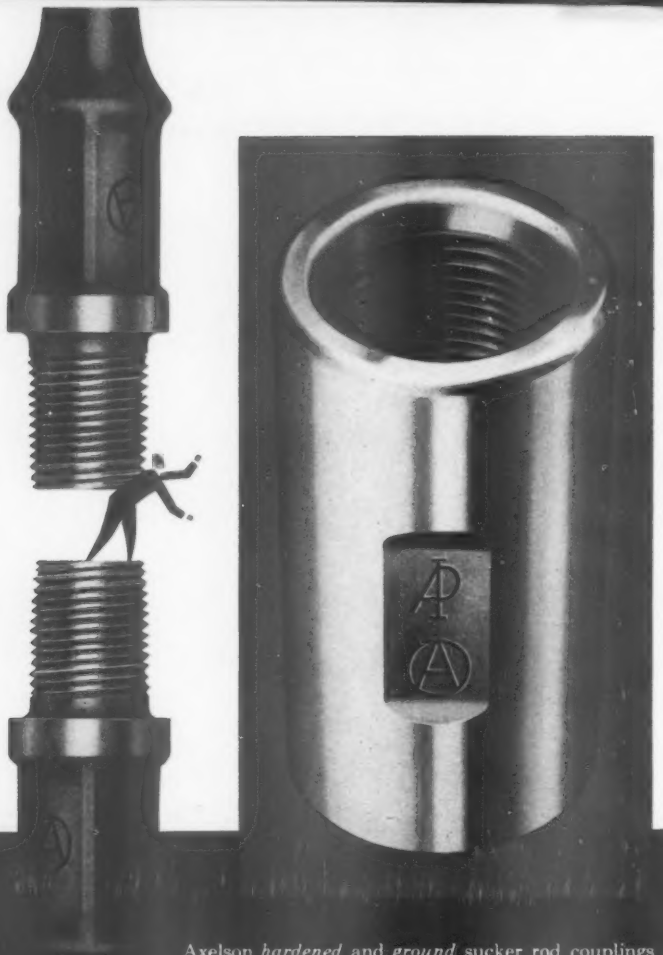


Plantation's highly mechanized pumping stations are operated from these Westinghouse control panels. Electrical pressure gauges were specially developed to permit the use of the simplified flow-control board.



Big explosion-resistant Westinghouse motors drive the pumps on the Plantation Pipeline. These motors were especially designed and built for pipeline duty and they have given outstanding service.

Axelson sucker rods, fully heat treated and normalized, are available in sizes and grades for every pumping condition.



AXELSON COUPLINGS INCREASE ROD LIFE

Axelson *hardened* and *ground* sucker rod couplings are designed for increased life of the rod string and the well tubing. Specially developed processes in heat treating and machining give Axelson couplings an extremely hard, highly polished outer surface to resist wear, a metallurgically correct tough interior, which permits machining of threads to withstand shock loads. By accurate threading after heat treatment, there is no possibility of thread distortion, and the sucker rods are held in absolute alignment. Remember—you can argue quality at the surface—but it's *proved* at the bottom of the well.

Chosen for to last!

AXELSON

PETROLEUM PUMPING EQUIPMENT

OUR 60th YEAR

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON MANUFACTURING CO.
PLANTS — Los Angeles 58, California; St. Louis 16, Missouri. OFFICES — New York City 7, New York; Tulsa 1, Oklahoma; Buenos Aires, Argentina

DISTRIBUTORS — Jones & Laughlin Supply Co.; Great Northern Tool & Supply Co.; Industrial Agencies, Ltd., San Fernando, Trinidad, B. W. I.; Industrias Waldrip & Campbell, Barcelona, Caracas and Maracaibo, Venezuela; South American Supply Co., Ltd., Lima, Peru; Sociedad Comercial de Materias Primas Limitado, Rio de Janeiro, Brazil; G. Saavedra e Hijos, S. de R. L. Avenida Morelos 31, Mexico, D. F.; Dominion Oil Field Supply Co., Ltd., Calgary, Canada.

55 gallon, 12 gauge solid Nickel shipping and storage drums built to I.C.C. Specification 5K.

How to lower shipping costs on highly corrosive chemicals

Are you concerned with the shipping and storage of dangerous and corrosive chemicals?

Then you'll find these five advantages of Nickel and Nickel Alloy drums of interest . . . *and profitable!*

LIGHT WEIGHT. Nickel and Nickel Alloy drums often cut to ⅓ the tare weight of shipping and storage containers. They save on manpower and on shipping and handling costs without reducing volume.

CORROSION-RESISTING. These drums do not chip or peel. Their resistance to corrosion reduces metal pickup, helps maintain product purity, eliminates need for corrosion inhibitors.

STRONG. High mechanical strength and toughness mean Nickel and Nickel Alloy drums do not crack or break open despite rough handling.

DURABLE. Nickel and Nickel Alloy drums give years of trouble-free service. And should minor damage occur, they are easy to repair by welding, brazing or soldering methods.

I.C.C. ACCEPTED. Many corrosives are at present being handled with I.C.C. approval. A partial listing includes: Monel® drums (I.C.C. Specification 5M) liquid bromine and hydrocyanic acid: Solid Nickel drums (I.C.C.–5K) acetyl, benzyl, benzoyl, thiophosphoryl, pyrosulfuryl, and thionyl chlorides, as well as phosphorus trichloride and phosphorus oxychloride.

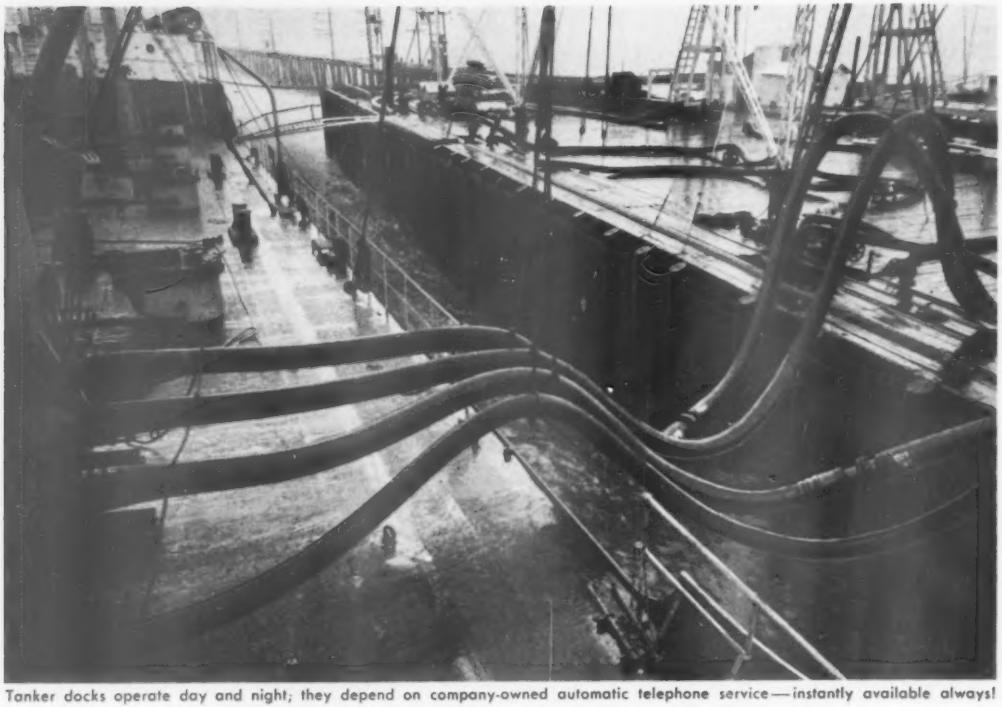
Perhaps you have other corrosives for which I.C.C. specifications are not yet established. Now is the time for you to investigate Nickel and Nickel Alloy drums so that you can have I.C.C. acceptance when these drums again become available for extensive use. Write for full information, today.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

NICKEL ALLOYS

MONEL® • "S"® MONEL • "K"® MONEL "KR"® MONEL • "S" MONEL • NICKEL LOW CARBON NICKEL • DURANICKEL® • INCONEL® INCONEL "X"® • INCOLOY • NIMONICS



Tanker docks operate day and night; they depend on company-owned automatic telephone service—instantly available always!

Oil company with a sensitive *nervous system*

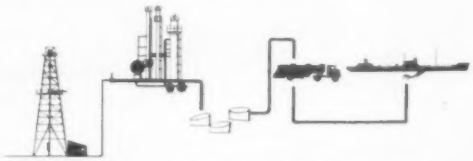
At dockside . . . in the drilling field . . . throughout widely separated areas where crude oil is processed into finished products — Union Oil Company's P-A-X Business Telephone System keeps hundreds of miles of Oil operations under control twenty-four hours a day.

Automatic, *company-owned* P-A-X telephone facilities speed work in Union Oil's Southern Division, step up economies and convenience in all operations. This widespread network of telephone communications links *all* levels of management to *all* company locations throughout the division.

P-A-X is job-designed for oil companies

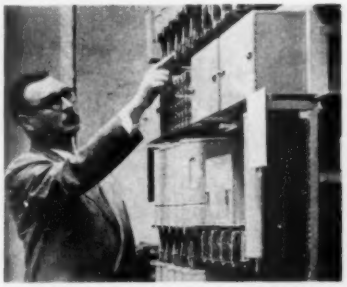
Scores of oil companies have used speedy P-A-X Systems to improve refining operations — control pipeline flow — tighten administration — tie all operations together in a unified communications system. P-A-X telephones, switchboards and circuits meet the most exacting control needs of the oil industry.

P-A-X is a system of "inside" telephones, separate from the public telephone system, and owned by the user. It is completely automatic and establishes all "inside" calls within seconds, at any time! P-A-X service permits marked economies in rental of city equipment. Manufactured by Automatic Electric, the originator of the automatic telephone, P-A-X telephones and switchboards are equal in quality to the finest equipment anywhere!

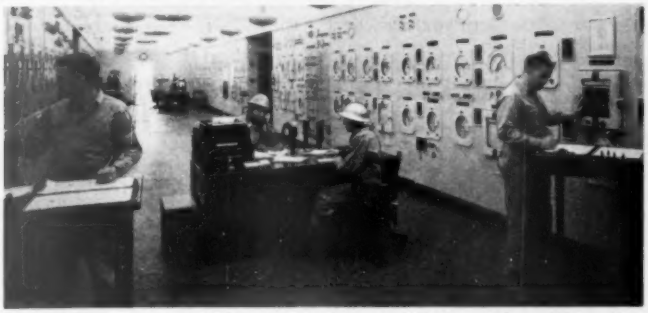


Union Oil's 1200 miles of pipe lines transport 70,000,000 barrels annually. Pipelines converge at storage tanks and pump stations. Each control point is equipped with a P-A-X telephone.

George Robertson, Maintenance Engineer, with Lenkurt Carrier equipment which permits each pair of wires to carry several calls simultaneously.



Fred Broughton, Union Oil's Communications Engineer responsible for planning the P-A-X Telephone System with the General Office switching equipment.



Control room of Union's large modern refinery at Wilmington. Operators receive P-A-X telephoned instructions to adjust the controls. P-A-X telephones give the Pump House Dispatcher precise control of oil flow.

Interested in more information? This comprehensive booklet—a case study of Union Oil communications—is yours for the asking. Detailed facts are presented in 12 abundantly illustrated pages. Write for your copy today!

AUTOMATIC ELECTRIC

Makers of Telephone, Signaling and Communication Apparatus... Electrical Engineers, Designers and Consultants

Distributors in U.S. and Possessions:
Automatic Electric Sales Corporation...1033 West Van Buren Street, Chicago 7, U.S.A.
In Canada: Automatic Electric (Canada) Limited...284 King Street West, Toronto, Ontario
Export Distributors: International Automatic Electric Corporation, Chicago

Union Oil Company coordinates widespread operations with its own telephone system

Union Oil Company of California—largest and oldest "independent" in the West—has 2,000 wells pumping from 600,000,000 barrels of reserves. Union's 1,200 miles of pipe lines transport 70,000,000 barrels annually and its fleet of seven oil tankers transports oil and derived products regularly to South America, Hawaii, Alaska, and ports in other far-flung places.

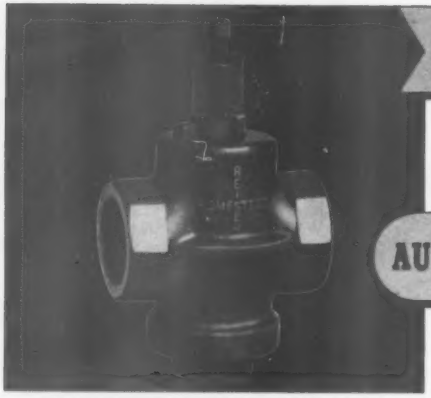
Distance and dispersal—coupled with the necessity for split-second coordination—created difficult communication problems. Union Oil solved these problems with uninterrupted "private-wire" P-A-X telephone communications, engineered to allow for unlimited expansion. Today, the company saves dollars and time and resolves formidable problems of distance with its own telephone system. Since its new telephone system was "cut in", Union Oil personnel make more than 11,000 calls each day.

Several different types of circuits are used by Union Oil to complete their trunk line system. These include wire, phantom and carrier circuits. Through use of carrier equipment, a single pair of telephone wires carry a number of

Reporting work progress on Field Dispatcher's telephone.

telephone calls simultaneously—an easy way to expand a telephone system without large investment in physical lines or use of critical materials. The carrier equipment is Lenkurt Carrier, engineered and installed by Automatic Electric as an integral part of the over-all communications system.

The P-A-X network provides a complete communications "package" that controls every operation from the pumping of crude oil to final distribution of refinery products. This system is company-owned, -operated-and-maintained. Management has complete freedom in adapting its own telephone network to the ever-changing, greatly increasing demands of its extensive and complex oil operations.



Semi-Steel or Cast Steel Threaded or Flanged Ends

THESE VALVES... HAVE CURED A LOT OF MAINTENANCE HEADACHES, because they...

AUTOMATICALLY ADJUST FOR WEAR

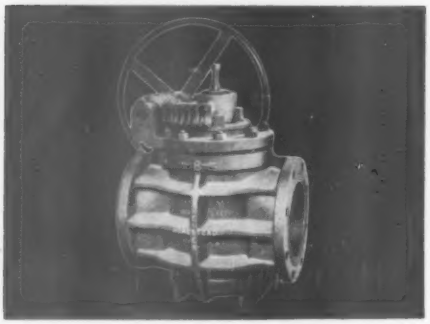
Wear, that in most valves would cause leakage and necessitate complete valve renewals, simply doesn't faze a HOMESTEAD-REISER.

Its two-piece, wedge-acting plug constantly and automatically adjusts itself to make up for wear as wear occurs. The valve acts on its own. *It is SELF-SEALD!*

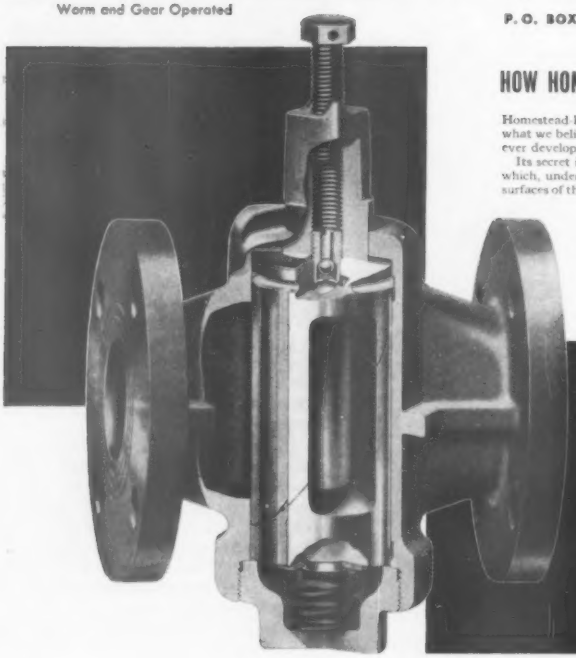
Result: Extra long, leakless service life . . . more operations between lubrications . . . less maintenance . . . lower plant operating costs.

Available in semi-steel or cast steel; 100% port area or Venturi type; sizes ½" to 14" for steam working pressures to 150 lbs.; or oil . . . water . . . gas to 200 lbs.

Complete data and prices will be sent on request. Write today for VALVE REFERENCE BOOK No. 39. No obligation.



Worm and Gear Operated



HOMESTEAD

VALVE MANUFACTURING CO.

P. O. BOX 403 *"Serving Since 1892"* CORAOPOLIS, PA.

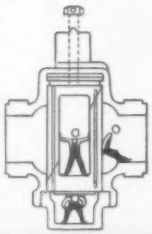
HOW HOMESTEAD-REISERS SEAL THEMSELVES

Homestead-Reiser's self-sealing action is based on what we believe is the most effective sealing principle ever developed for lubricated plug valves.

Its secret is the wedge-action of the two-piece plug which, under line pressure, causes the finely finished surfaces of the plug to press outward against the body.

A full lubricant seal surrounds the ports, and the top and bottom of the valve.

The self-sealing, wedge action keeps the plug surfaces in constant contact with the mirror-like bore of the body. It provides automatic adjustment for wear and assures extra long valve life with maximum leakless service.



HOMESTEAD-REISER

Self-Seald...Lubricated

PLUG VALVES

How To Identify A Good Rope

All sizes from ¾" up are trademarked with red and green yarn to remind you later that it was "American Brand", used or abused, that lasted longer.

"American Brand"
PURE MANILA ROPE

Any maintenance item at your near-by Jones & Laughlin Supply Store is selected with greater care than any one consumer could reasonably or profitably devote to the subject.

Catlines . . . Spinning Lines . . . Drilling Cables and Crackers . . . Derrick Lines . . . Bull Ropes . . . nance, Heavy Construction and . . . Rope for Refinery Maintenance all Marine Uses.

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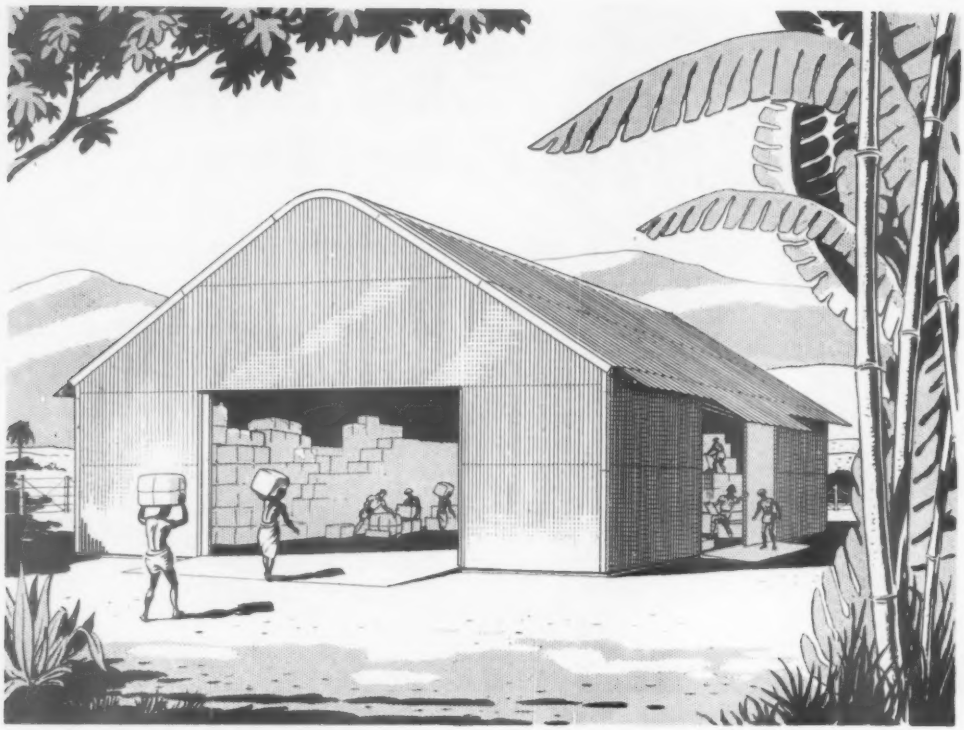

'Arcon' built—*and a 'special' for Space!*

(1) *A labour force of eight unskilled men can easily put up the framework of an 'Arcon' 3-bay Storage Building in approximately 27 hours.*

(2) *The walls and roof are made of durable, corrugated asbestos cement sheeting, which is easy to fit. 'Arcon' doors and windows can be inserted where needed; transparent corrugated sheets ("Perspex") may also be fitted as desired.*

(3) *This is the finished 'Arcon' Storage Building; its form of construction makes it easy to extend or modify to meet changing requirements.*

'Arcon' Storage Buildings are proving their worth all over the world. A case in point is the use of such a building for Customs and loading sheds in harbour development in Australia. Point by point the 'Arcon' Structure suited all requirements perfectly; it could be erected at short notice by unskilled men with the minimum of specialist supervision; it provided ample space which could be made larger still, if necessary, by simply adding extra bays on the principle of 'Arcon' flexible planning; and finally, the finished 'Arcon' Storage Building would be strong, fireproof, and indeed almost indestructible equally suitable for a warehouse, machine-shop, or for meeting a variety of accommodational needs. We have also supplied this type of building for use as garages in Burma and the Sudan; whilst a further successful application has been proved in West Africa, where the 'Arcon' Storage Building was supplied to construct a native market.

We will gladly send you our free brochure giving you full details of the 'Arcon' Storage Building. You will be able to see clearly how well 'Arcon' can answer *your* needs.

'ARCON' *Structures*

Write to:

TAYLOR WOODROW (BUILDING EXPORTS) LTD

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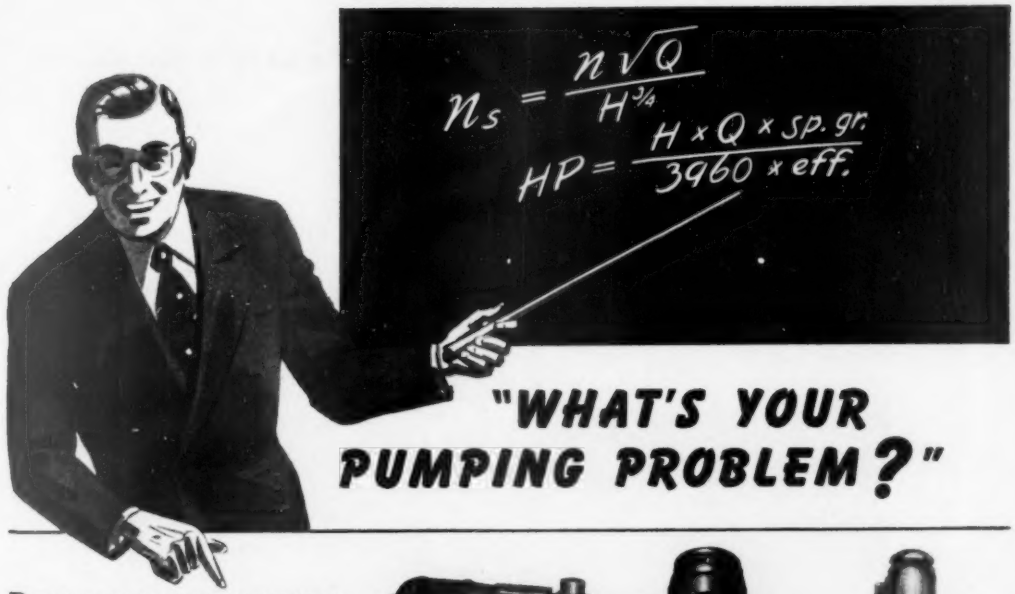


"WHAT'S YOUR PUMPING PROBLEM?"

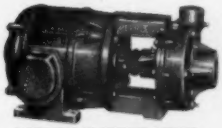
PEERLESS HAS THE *ANSWER*

Many of the problems of transferring liquids which are troublesome to you today have probably already been successfully studied and solved for others by our engineering department.

Problems arising from countless combinations of conditions of capacity, head, temperature, pressure, specific gravity, viscosity, volatility, chemical analysis, solids concentration, NPSH and other variables have been resolved by our hydraulic engineers. From thousands of case histories we can counsel with you on everything from pump cavitation caused by incorrect sump construction, to the design limits of impeller diameters as effected by peripheral speeds.

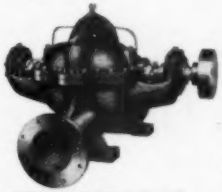
Why not take advantage of a backlog of 30 years of practical pumping experience to solve your liquid transfer problems?

Hand us your pumping problem. We believe we can give you a successful Peerless answer to it from the scores of types and hundreds of models of horizontal and vertical Peerless pumps.



PEERLESS FLUIDYNE PUMPS

A line of face mount and flexible-coupled, electrically driven pumps for almost universal water pumping application. Capacity range: to 5500 gpm. Completely described in Bulletin No. B-2300.



PEERLESS TYPE A PUMPS

The standard of the industry for high quality, split-case horizontal pumps. Capacity range: up to 70,000 gpm. Completely described in Bulletin No. B-1300.

PEERLESS CLOSE-COUPLED VERTICAL TURBINE PUMPS

Widely and successfully used in cooling tower service and pumping from surface water sources. Up to 2500 hp. Completely described in Bulletin No. B-159.

PEERLESS HYDRO-FOIL PUMPS

The giants in the world of moving water. Both propeller and mixed-flow types available. Completely described in Bulletin No. B-148.

Remember—**PEERLESS BUILDS *DEPENDABLE* PUMPS**

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☐ TYPE A PUMPS ☐ CLOSE COUPLED PUMPS

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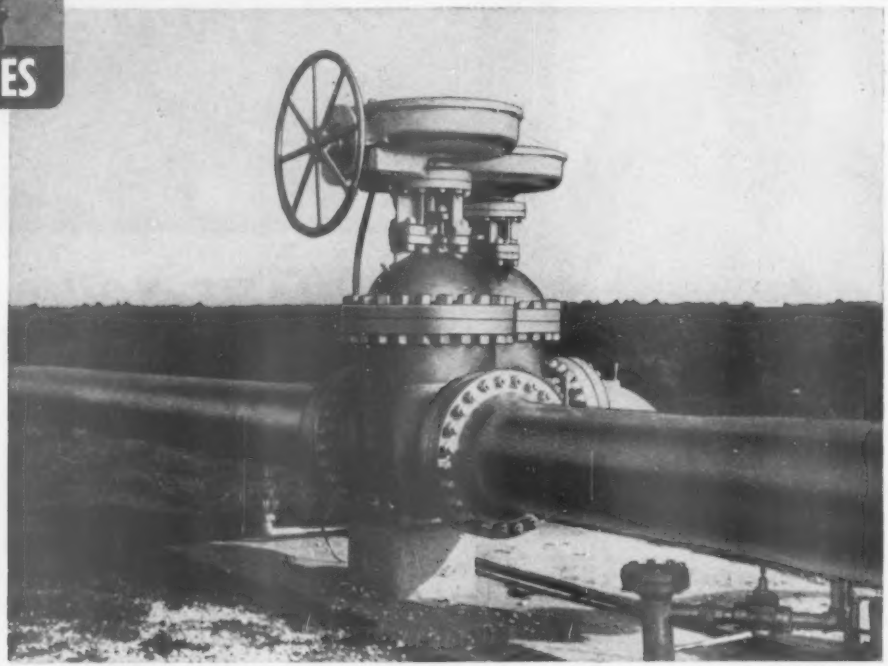
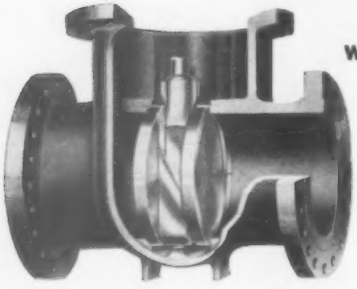
DARLING VALVES

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN



Above: A pair of Darling 20" cast steel gate valves, equipped with bevel gear and gear case, installed on a major oil line. Because of tight closure and trouble-free performance in general, Darling fully revolving double disc parallel seat valves win favor on line after line.



Cutaway view showing complete simplicity of the Darling fully revolving double disc, parallel seat cast steel gate valve. Just four simple working parts . . . two interchangeable, no-pocket discs and two husky wedges. Maintenance is easy, assembly foolproof. Full seat opening allows free passage of line scrapers.

with Darling revolving double disc parallel seat gate valves

You can count on tight closing!

YOU can't entirely avoid valve body distortion in pipe line service. No matter! Darling's compensating wedge principle *automatically* adjusts for seat misalignment! Moreover, the gate discs, independently hung and free to revolve fully, change their seating position at each closing. This means *uniform* wear distribution. The valves work better and last longer, require less attention, less maintenance! And *you* avoid headaches.

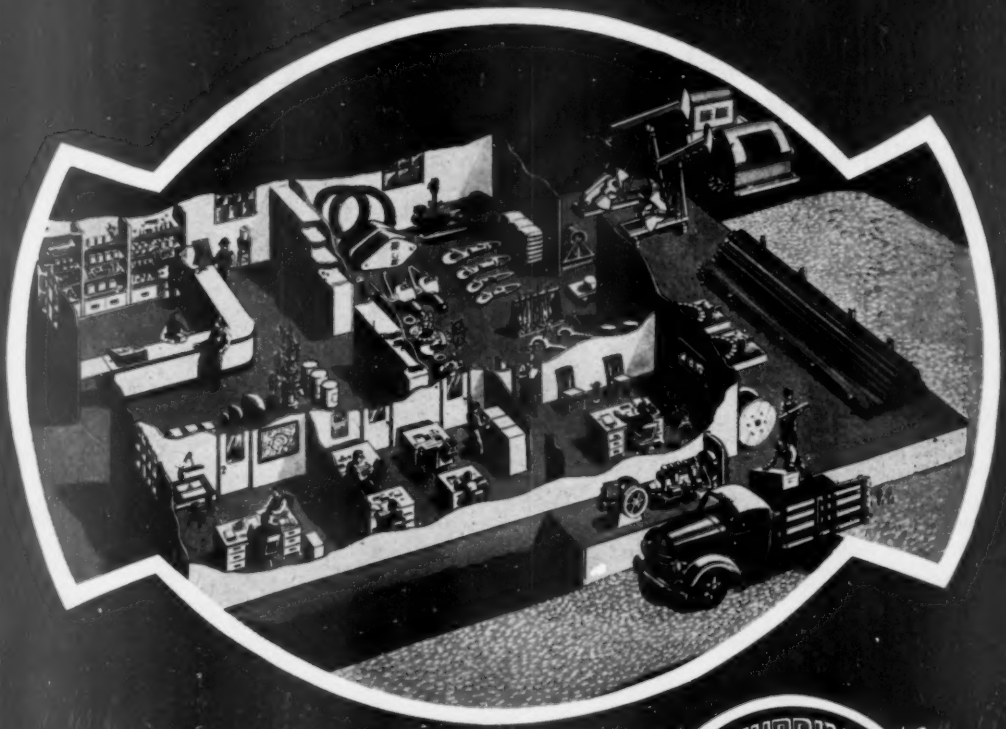
SEND FOR DATA

Darling fully revolving double disc gate valves come in a wide range of types and sizes for main line, gathering, manifold, tank farm and all other gas and oil line services. Outline your particular service needs or ask for complete descriptive bulletin.

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario



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FOR A COMPLETE LINE
OF OIL FIELD SUPPLIES

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Bovaird

SUPPLY COMPANY

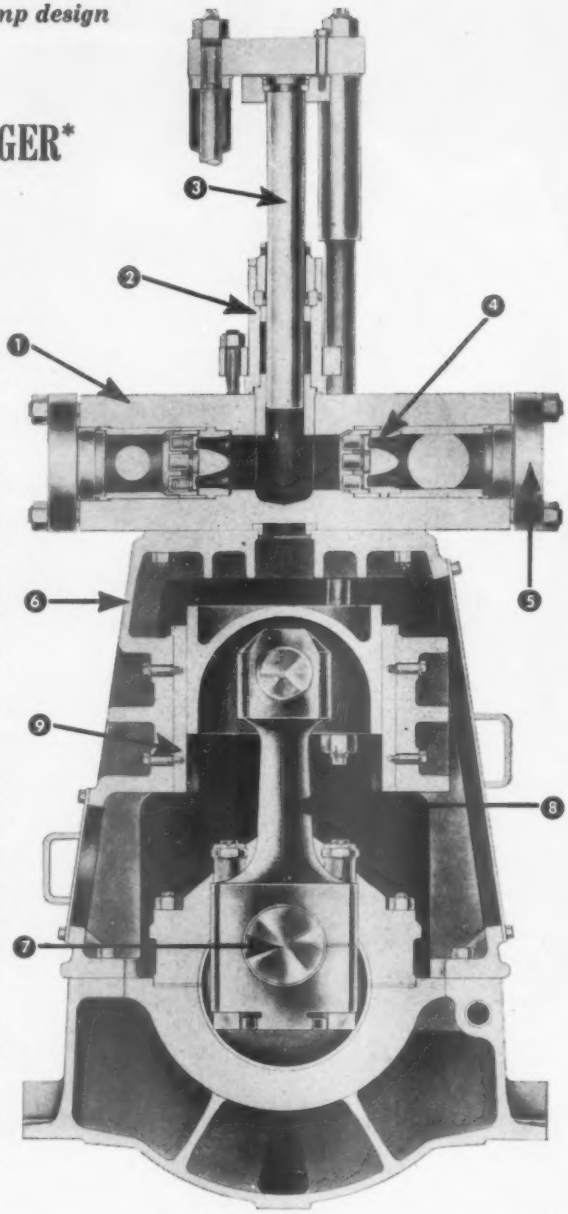
TULSA, OKLAHOMA

YEARS OF PROGRESS WITH THE OIL INDUSTRY

The inside story of a new power-pump design

THE WORTHINGTON HEAVY-DUTY MULTI-PLUNGER* VERTICAL POWER PUMP

To users of Worthington pumps, "heavy-duty construction" is almost taken for granted. But when Worthington engineers make a special effort to put *extra* ruggedness into a pump, you have something comparable to this Worthington Multi-Plunger Power Pump. Study the features and see for yourself!



ON THE LIQUID END

1. LIQUID CYLINDER—made of forged steel with large fluid passageways bored from solid forgings for maximum strength.

2. STUFFING BOXES—forged-steel barrels, bolted directly to cylinder with extra-deep boxes that permit maximum interchange of plunger sizes.

3. PLUNGERS—made from hardened and ground alloy steel or any other suitable metal. Solid ceramic plungers can be furnished for corrosive applications.

4. VALVE SERVICE—stainless-steel, heat-treated valves and valve seats. High-strength valve springs and bolted valve-hole covers.

5. INDIVIDUAL VALVE HOLE COVERS—one for each valve, permits quick and easy access.

ON THE POWER END

6. CAST-IRON FRAME—totally enclosed, with design that permits torque to be applied near foundation. All bearing surfaces and running parts pressure lubricated.

7. ONE-PIECE STEEL CRANKSHAFT—one-piece forged steel, accurately turned and ground to size. Heavy sections for minimum shaft deflection when loaded.

8. CONNECTING ROD—marine-type, forged-steel, with steel-backed, babbitt-lined crankpin bearings and solid bronze crosshead pin bearings.

9. CROSSHEAD CRADLE LINERS—solid cast iron with bronze liner shim adjustable to permit careful alignment.

10. BRONZE-SHELL MAIN BEARINGS†—two-piece bronze shell design babbitt-lined with large bearing surface for longest-life. Precision made for trouble free operation.

If your application calls for a power pump of this size, *or any other size,* write, stating specific requirements, to Worthington Corporation, Reciprocating Pump Division, Harrison, New Jersey.

*available in 3, 5 or 7 plunger arrangements (300, 500, 700 hp)
†not shown in drawing

P.2.2

The World's Broadest Line Assures You the Right Pump for Every Job

WORTHINGTON
Power Pumps

FISHER

TYPE

MULTI-PURPOSE PRESSURE REDUCING

Gas Regulator

99

CAPACITY:
99,000 CFH at 100 PSI inlet pressure.

VERSATILITY:
For engine fuel systems, for industrials and for gas distribution systems.

PILOTS:
Low Pressure — 3 springs — 4 oz. to 2 PSI; 2 PSI to 10 PSI; 10 PSI to 20 PSI.
High Pressure.....10 PSI to 65 PSI.

The Fisher Type 99 is truly a multi-purpose regulator — its versatility makes it adaptable to hundreds of applications now requiring an assortment of several types of regulators.

Because of its unexcelled performance and wide range of application, it is the ideal regulator to always have in stock.

For complete details, write for Fisher Bulletin P-99A.

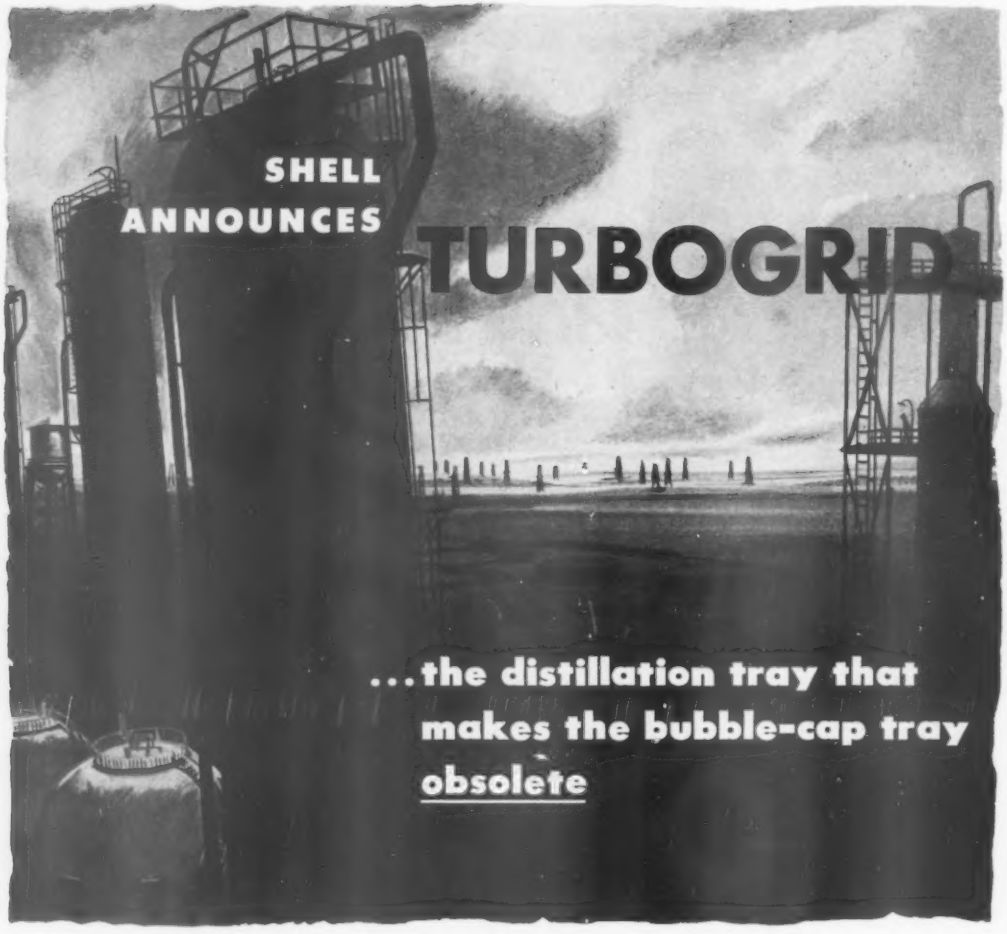
FEATURES:

- Factory pre-set spring provides powerful lock-off action.
- Large, effective area of main diaphragm in combination with relay pilot assures trouble-free accuracy.
- 2" threaded inlet and outlet. Standard hi-tensile iron body for up to 150 PSI inlet, XH or bronze body for up to 250 PSI inlet.
- Composition valve disc assures tight shut-off on zero flow and excellent regulation from no flow to maximum capacity.

FISHER

FISHER GOVERNOR COMPANY, MARSHALLTOWN, IOWA

LEADS THE INDUSTRY IN RESEARCH FOR BETTER GAS PRESSURE CONTROL



a major advance that permits

(a) breaking existing plant bottlenecks

(b) full new plant capacity at lower cost

(c) long tray life, easy maintenance

SHELL's simple Turbogrid tray offers outstanding advantages in performance and cost . . . advantages that result in much **higher capacity** and in operating economy. Performance has been fully *proven* in many commercial installations.

Turbogrid trays **increase throughput in existing towers,** or deliver required throughput at lower cost in new plant construction. The greatest capacity advantages are obtained with critical separations, such as depropanizers and stabilizers. Still other advantages are lower column holdup and pressure drop, as well as easier column control.

Simple construction assures lower fabrication, installation and maintenance costs and easier accessibility to all parts of the tray. Standardized design permits use of **corrosion-resistant alloy trays at no extra cost.**

Your inquiries are invited. Turbogrid trays are available from selected contractors, licensed by Shell Development Company.

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SHELL

"For rugged service use U. S. Royal 4,"

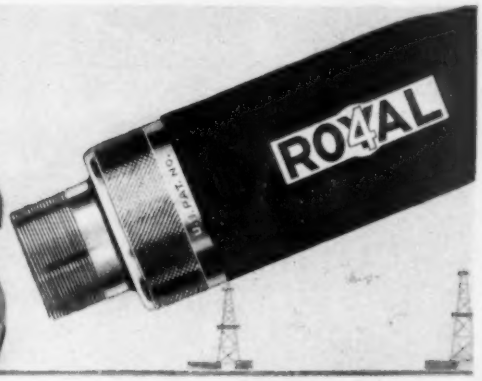
says "Red" Royal

Many and many a driller agrees with "Red" Royal. They will tell you that U.S. Royal 4 can't be beat for the high-pressure jobs.

This great hose is actually two hoses in one. It has 2 double wire layers—each strong enough to resist bursting should the other ever become damaged.

"And", says Red Royal, "don't forget that for shallow well drilling, your best bet is U.S. Peerless Hose. In the lower price range, it has all the strength and flexibility required for this type of work."

Available in all FIELDS at the BEST SUPPLY STORES



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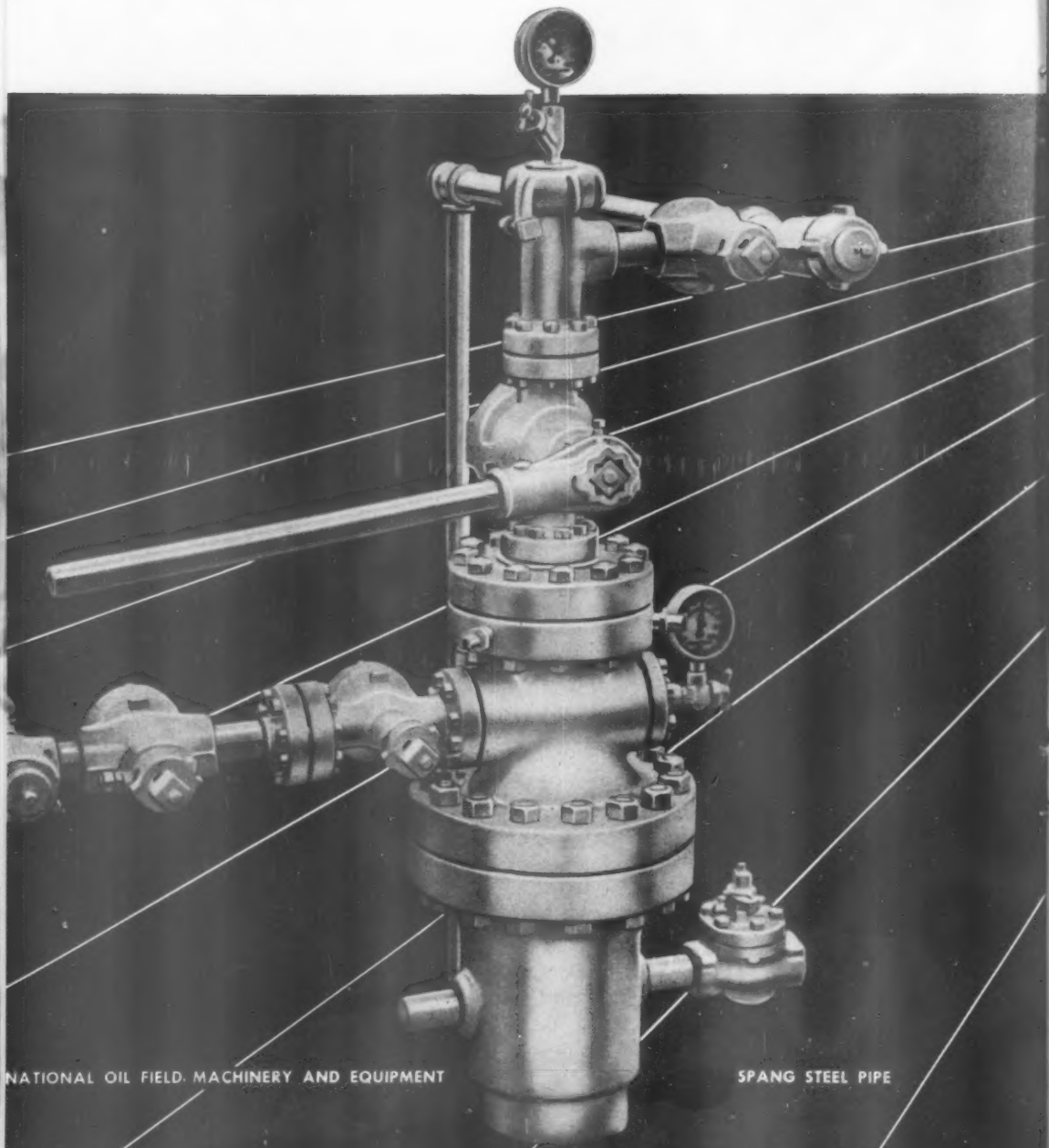
UNITED STATES RUBBER COMPANY

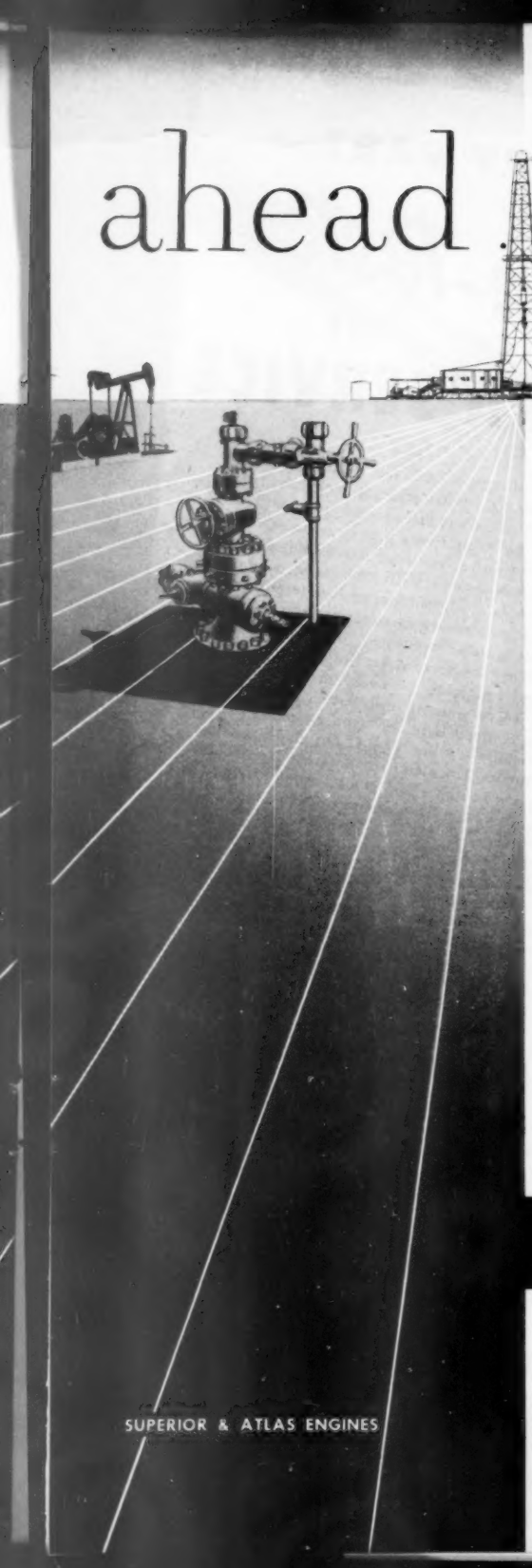
MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

for the well



NATIONAL OIL FIELD MACHINERY AND EQUIPMENT

SPANG STEEL PIPE



ahead . . . *choose*

NATIONAL WELLHEAD EQUIPMENT

National Wellhead Equipment is designed with every operating contingency in mind—making it easier to tailor, from standard parts, any wellhead installation to meet your specific needs, with features such as:

- Triple-sealed Pressure Pack design for trouble-free, *safe* performance.
- Simplicity of assembly—parts are self-locating—self-activating, which makes for easy installation.
- Flexibility of design—interchangeable units afford a multitude of combinations to meet specific requirements in size, capacity and type.
- All Type "B" Pressure Pack "Trees" assembled at our Houston Plant are hydraulically tested prior to shipment to facilitate field installation and provide immediate dependable service.

Contact your nearby National Supply Company store for parts service and consultation on your wellhead problems.

THE NATIONAL SUPPLY COMPANY

GENERAL SALES OFFICES: PITTSBURGH 30, PA.

DIVISION OFFICES: Casper; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Limited, 702 Barron Building, 610 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London, E.C. 2

NATIONAL BLUE PRODUCTS

EVERY PART
Pre-tested
For
EXTRA SERVICE
Pins, bushings, rollers, side plates . . . as raw material, after fabrication, during heat treating and before and after assembly are all "pre-tested" by Atlas. Every part or piece of metal that goes into a length of Atlas Chain is carefully "pre-tested" with the latest scientific equipment . . . tested and torture-tested again and again to assure extra service life.
This sturdy "pre-tested" longer life built into every length of Atlas Roller Chain means rugged toughness on every installation . . . with velvet smooth operation. That is why Atlas Roller Chain has won the name of the "super-life" roller chain. On drilling rigs, conveyors, large and small power drives and wherever roller chain is used Atlas Chain has won the reputation of more service with less servicing.
For maximum performance that has been "pre-tested" during manufacturing and performance-proved from coast to coast, install Atlas Roller Chain. Available through leading distributors throughout the nation. Write today for new Atlas handbook and catalog on roller chain. Atlas Chain & Manufacturing Co., Philadelphia 24, Pennsylvania.
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DRAW A BEAD ON BOILER CARRYOVER

CARRYOVER refers to the entrainment of boiler water in the steam from any source, especially when it is due to foaming, priming or other causes. No matter what "IT" is called, anything other than dry steam going over from the boiler may lead to difficulties!

Use DREW POWER CHEMICALS

Almost all suspended and soluble materials in your boiler water system contribute to Carryover. They may lead to expensive trouble in boiler, steam and condensate lines and equipment and processes using steam. It's the duty of every good water treatment company to recognize and solve this problem.

Draw a bead on Carryover! Call the Drew engineer. The water samples and operating data that he obtains in your plant will be thoroughly analyzed in the Drew laboratories. You'll be given specific recommendations for corrective and preventive treatment . . . involving the use of Organics or Anti-Foams where necessary. And you'll receive continuous and frequent service, too!

Thorough investigation, proper treatment and frequent service have made Drew one of America's fastest growing water treatment companies. Consult the nearest Drew engineer, or write for information.

Power Chemicals Division

E. F. DREW & CO., INC.

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SAN FRANCISCO CHICAGO PHILADELPHIA BOSTON DALLAS
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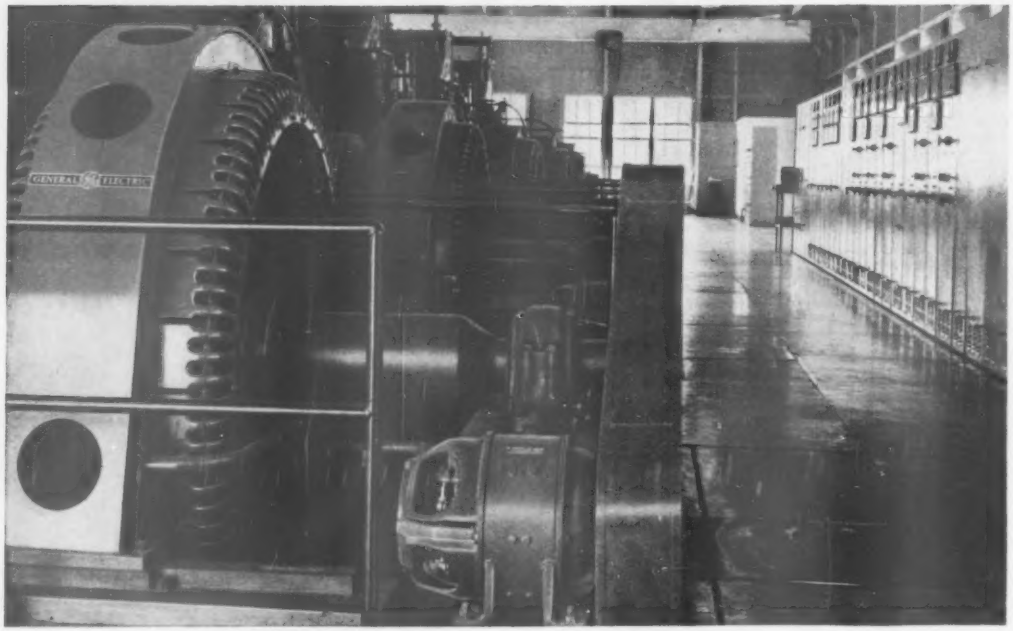
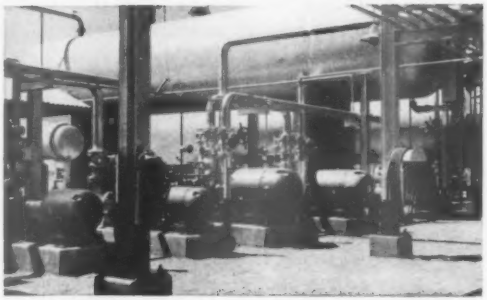
Service throughout the United States, Canada and South America

DREW PRODUCTS

Electrically co-ordinated for efficient gas stripping!



Supplying all power for Stanolind's North Cowden plant are these five G-E gas engine-driven 800-kw a-c generators, with provision made for three more when needed. Power plant also includes (right) the main G-E 4160-volt metal-clad switchgear.



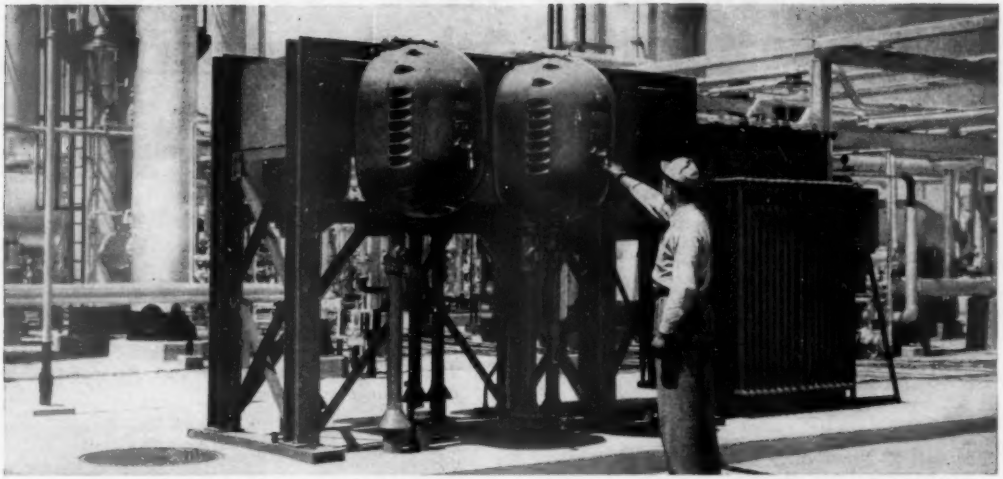
In hazardous refinery areas, use of explosion-proof motors—like these four G-E Tri-Clad® explosion-proof units at North Cowden—eliminates need for specially constructed rooms, permits locating motors for convenience and space economy.

Co-ordinated ELECTRIC EQUIPMENT

for Gas Repressuring and Natural Gasoline Plants

Increase your workers' efficiency with General Electric's new Motor Selection and Application Course. A G-E "More Power to America" program, it gives the essentials on motors in 9 easy-to-take lessons. Bulletin GEA-4938-16 describes the course in detail. Write for it—now!

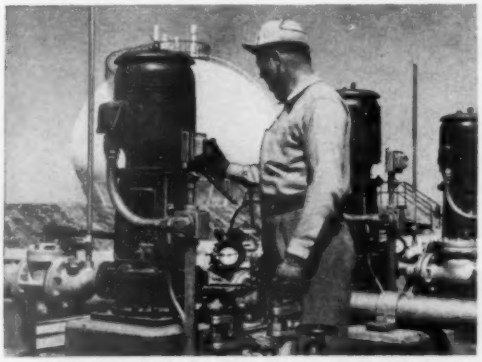
®Reg. trade-mark of General Electric Co.



For high service continuity, eight G-E 500-kva load-center substations serving low-voltage circuits are arranged for secondary selective operation. In hazardous areas, substations are equipped with explosion-proof breakers as shown here.

New G-E equipped gas repressuring plant maintains continuous output in processing separator gas

Stanolind Oil and Gas Company's gasoline plant at North Cowden, Texas, is designed to efficiently process 100 million cubic feet per day of separator gas (now equipped for 50 million cubic feet per day) for the recovery of 300,000 gallons daily of propane, butane, and gasoline. Part of its efficiency is due to the electric apparatus supplied by General Electric, co-ordinated throughout by close engineering co-operation with Stanolind and its contractors. Ask your G-E representative how *your* refinery's electrical needs, too, can be met by G-E's skill in application engineering and project co-ordination. *General Electric Co., Schenectady 5, N. Y.* 661-35



To meet refinery conditions, G.E. builds an extremely wide line of explosion-proof equipment. These three G-E 15-hp explosion-proof vertical motors, for example, are also equipped with explosion-proof Start-Stop push buttons.

In non-hazardous areas, refineries favor grouping low-voltage motor controls for easier maintenance, as with these G-E 440-volt Cabinetrol® units at North Cowden. Compact and standardized, they save space, cut installation costs.

GENERAL ELECTRIC

What tube steel gives you the best life/cost ratio? Ask the experts!

This month's report is on: **2% CR.-MO.**

Has intermediate corrosion resistance in combination with good creep strength and fair resistance to oxidation. For use at temperatures up to 1200° F. in cracking coils, reforming units, heat exchangers, vapor line and hot oil piping, and return-bend forgings for oil heaters.

23 TIMKEN® STEELS FOR HIGH TEMPERATURE SERVICE

Carbon	Sicromo 2	Sicromo 5S	16-13-3*
Carbon-Mo.	Sicromo 2¼	Sicromo 5MS	25-20*
DM-2	2¼% Cr.-1% Mo.	Sicromo 7	25-12*
Silmo	Sicromo 3	Sicromo 9M	35-15*
DM	4-6% Cr.-Mo.	18-8 Stainless	16-25-6*
2% Cr.-Mo.	4-6% Cr.-Mo.-Ti.	18-8 Cb	

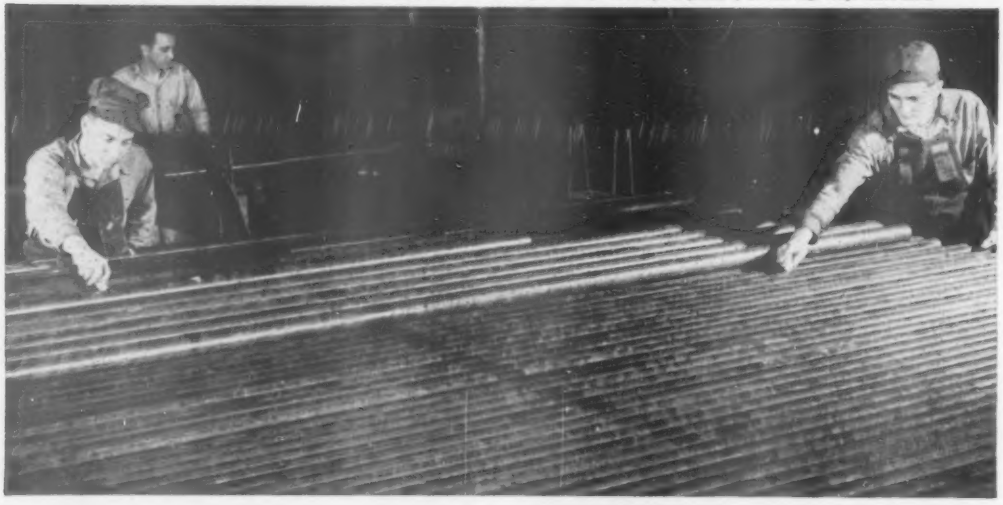
*Not available as seamless tubing at the present time.

MAYBE you can find several high temperature tube steels that will solve your particular set of heat, pressure, corrosion and oxidation problems. But there's only *one* steel that will give you maximum tube life per dollar—the best life/cost ratio.

To find that one steel, go to the metallurgists of The Timken Roller Bearing Company. They're recognized authorities on high temperature steels. Backed by 20 years' experience and research and with 23 different analyses at their disposal, they'll help you choose the one best steel for your application. And you'll be assured of uniform quality in every tube because of the Timken Company's rigid quality control from melt shop through final inspection.

Our "RSQ"—Research, Supply, Quality—can solve your tube problems. *Ask the experts!* The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

Photo below shows final tube inspection—last of hundreds of rigid tests that help account for the uniform quality of Timken high temperature steels.



YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

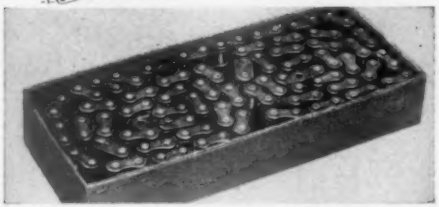
CHAIN ASSEMBLY . . . CHAIN REPAIR

THERE'S NOTHING TO IT!

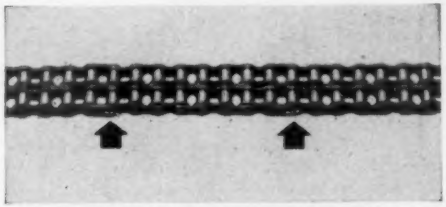
WITH IMPROVED BALDWIN ASSEMBLY RIVETED ROLLER CHAIN

When it comes to assembly, disassembly or repair of roller chain either at the rig or in the supply store, the improved Baldwin Assembly is your time-saving, money-saving, trouble-saving, temper-saving answer. There's virtually nothing to it. Here's all you do:

TO TAKE THE CHAIN APART

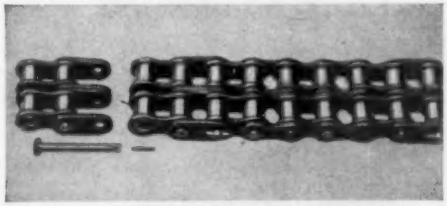


1 You buy Baldwin Assembly Chains in a packaged unit —a 10-foot strand in every box. Each chain is made up of sections of varying lengths joined by single coupler pins. Stretch the assembled chain out on the bench or the floor.



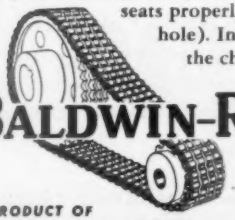
2 Locate and mark the coupler or couplers to be disconnected. Their distinctive straight edge side plates, locking pins and washer heads make them easy to locate.

3 Remove locking pin and drive flatted end of the coupler pin out of its side plate. Then tap it out the rest of the way with a drift pin. Before driving out the pin, back up the opposite side of chain with hammer or vise grip pliers to avoid springing the side plates.



4 That's how easy it is to take this chain apart. If a section you need is in the middle of the strand . . . just remove the coupler pin on either side of the section desired.

TO REASSEMBLE THE CHAIN. To couple this chain, just line up the free end of the coupler link with the adjacent roller link. Back up the link with hammer or vise grip pliers. Drive in the pin (being sure the flatted end seats properly in the flatted side plate hole). Insert the locking pin, and the chain is now reassembled.



BALDWIN-REX ROLLER CHAINS

A PRODUCT OF

Chain Belt COMPANY *OF MILWAUKEE*

It will pay you to investigate the Improved Baldwin Assembly. You'll find it will simplify your chain problems and save you real money. Ask about it at your supply store or use the coupon to send for Bulletin 52-3. Baldwin-Rex Oil Field Sales Offices located in New York • Tulsa • Dallas • Houston • Midland • Los Angeles.

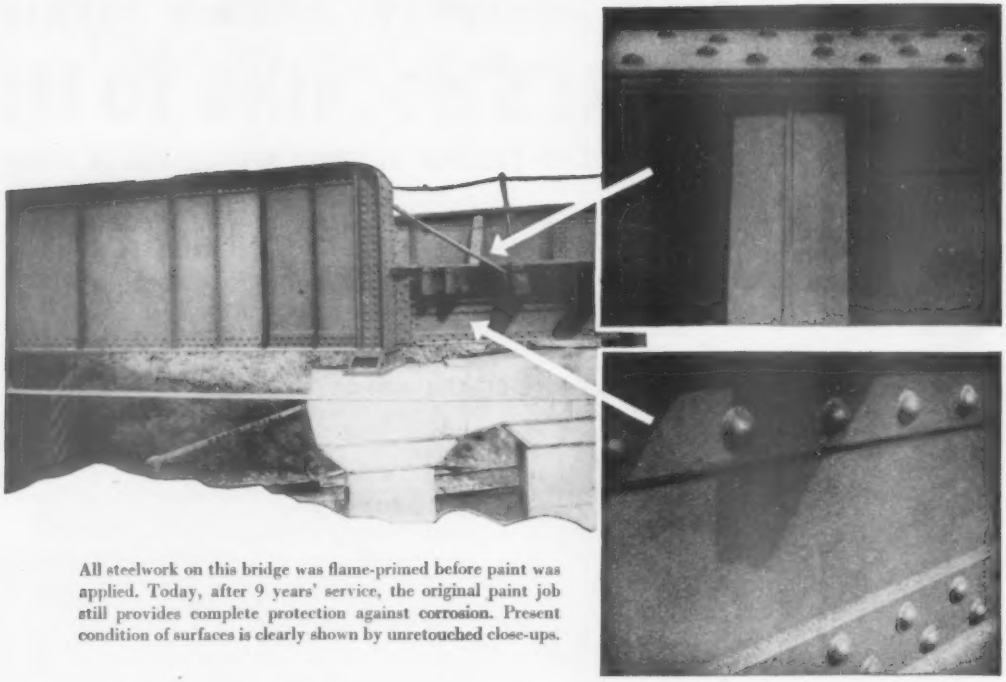
Chain Belt Company 52-413
4619 W. Greenfield Ave.
Milwaukee 1, Wis.
Please send me Bulletin 52-3.

Name.....

Company.....

Address.....

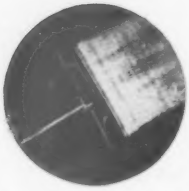
City.....*State*.....



All steelwork on this bridge was flame-primed before paint was applied. Today, after 9 years' service, the original paint job still provides complete protection against corrosion. Present condition of surfaces is clearly shown by unretouched close-ups.

Your Steelwork . . .

How Will It Look in 1960?



Steelwork you coat with good paint today can still look like new ten years from now, *if you flame-prime all exposed surfaces first.* And what you'll save on maintenance, because of increased protection due to flame-priming, will more than pay for all the flame-priming apparatus and materials you need for the job.

Flame-priming is simple to do, requires little equipment, and costs little. A brush of oxy-acetylene flames pops off scale and drives out moisture. Paint applied to the warm, dry surface goes on quickly and smoothly, bonds tightly, and lasts longer.

Flame-priming is one of many time- and money-saving LINDE methods for making, cutting, joining, treating, and forming metals. So, whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, more quickly, or at lower cost.

To find out, without obligation, telephone or write our nearest office today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in Other Principal Cities. In Canada: Dominion Oxygen Company, Limited, Toronto.

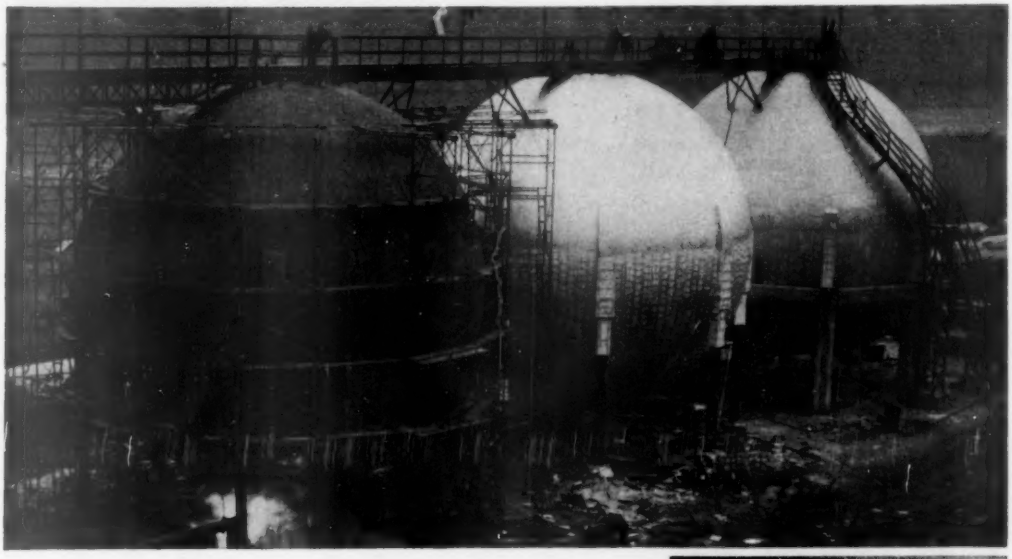
Linde Trade-Mark

Products and Processes for MAKING, CUTTING, JOINING, TREATING, AND FORMING METALS

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

The old insulation rotted and fell off—

NOW THEY PLAY SAFE WITH FOAMGLAS



● You should have seen these ammonia storage tanks—the old insulation was soaked with water and so rotten that it fell off in big chunks.

The owner decided that now was the time to do a *real* insulation job to hold these tanks at the required 15°F. FOAMGLAS was chosen because it is an excellent insulation and will not absorb water. And, since it is a true, inorganic glass, FOAMGLAS is impervious to all common corrosive chemicals —an important feature in a chemical plant like this.

FOAMGLAS is so easy to cut and fit that it was no trick at all to install it on these spherical tanks. You can cut FOAMGLAS with a saw, or simply score it and break it. Being a *friable* material, it can be pressed down over rivet heads or other objects and it will stay in place.

Let us send you a free sample of FOAMGLAS along with our latest booklet. Just mail the coupon.

PITTSBURGH CORNING CORPORATION • PITTSBURGH 22, PA.

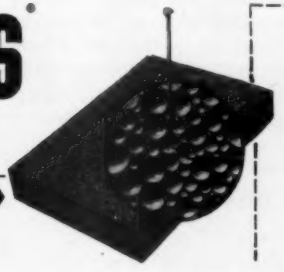
Insulation Contractor:
Industrial Furnace Supplies, Inc., Pittsburgh, Pa.

PITTSBURGH PC CORNING

FOAMGLAS®

the cellular glass insulation

The *best* glass insulation is cellular glass. The *only* cellular glass insulation is FOAMGLAS. This unique material is composed of still air, sealed in minute glass cells. It is light weight, incombustible, verminproof. It has unusually high resistance to moisture, chemicals and many other elements that cause insulation to deteriorate.



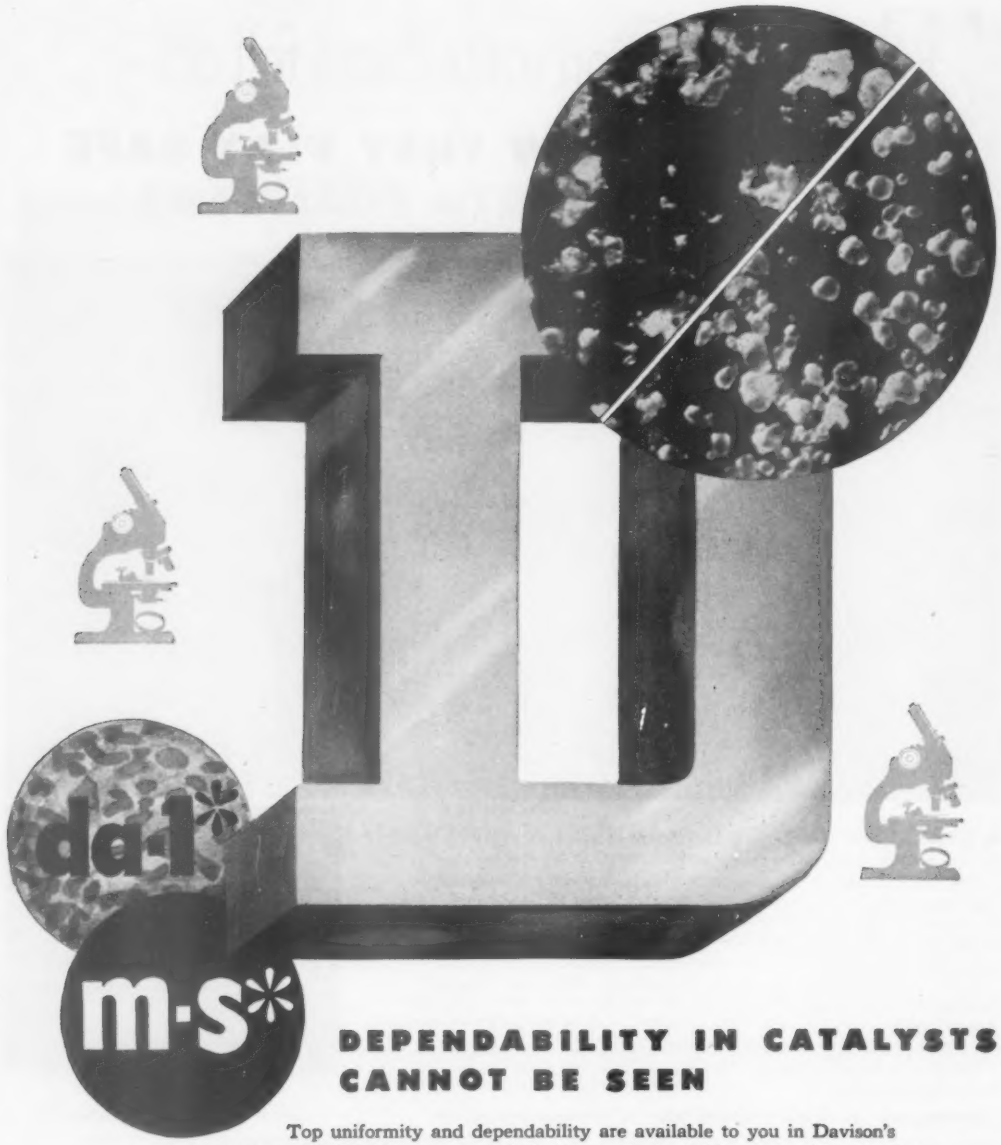
Pittsburgh Corning Corporation
Dept. DD-92, 307 Fourth Avenue
Pittsburgh 22, Pa.

Please send me, without obligation, a sample of FOAMGLAS and your FREE booklet on the use of FOAMGLAS for Piping and Process Equipment.

Name.....

Address.....

City.....State.....



DEPENDABILITY IN CATALYSTS CANNOT BE SEEN

Top uniformity and dependability are available to you in Davison's microspheroidal (M-S*) or ground (DA-1*) synthetic fluid-type cracking catalysts. The accompanying photomicrographs show the physical characteristics of the DA-1 and new M-S catalysts produced in Davison's Cincinnati plant. Uniform physical and catalytic characteristics result from Davison's modern facilities and years of technical experience and research Experienced Davison Field Service Engineers—complete laboratory facilities—are all part of Davison Dependability—Dependability with the big "D".

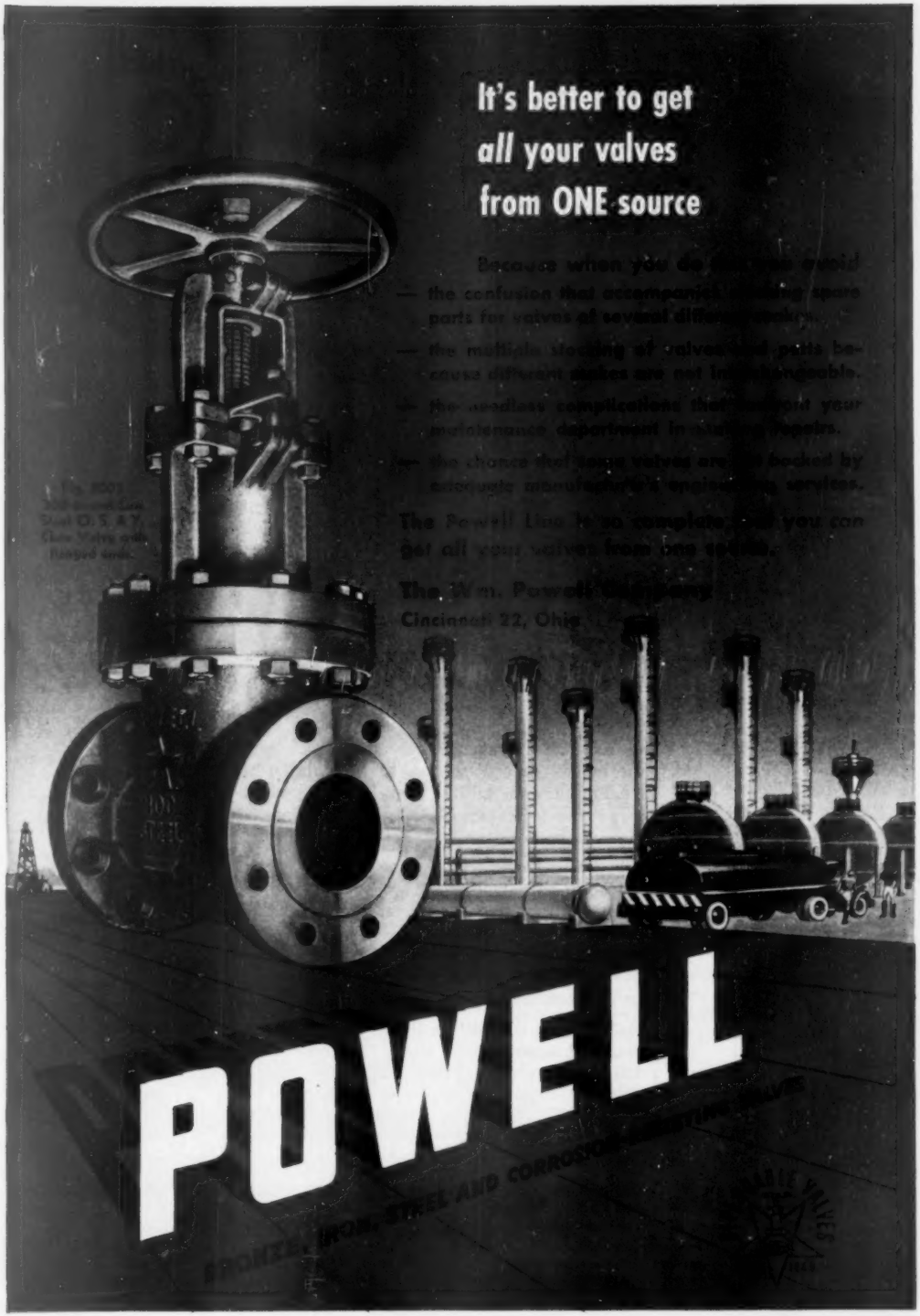
*T.M.T.D.C.C.

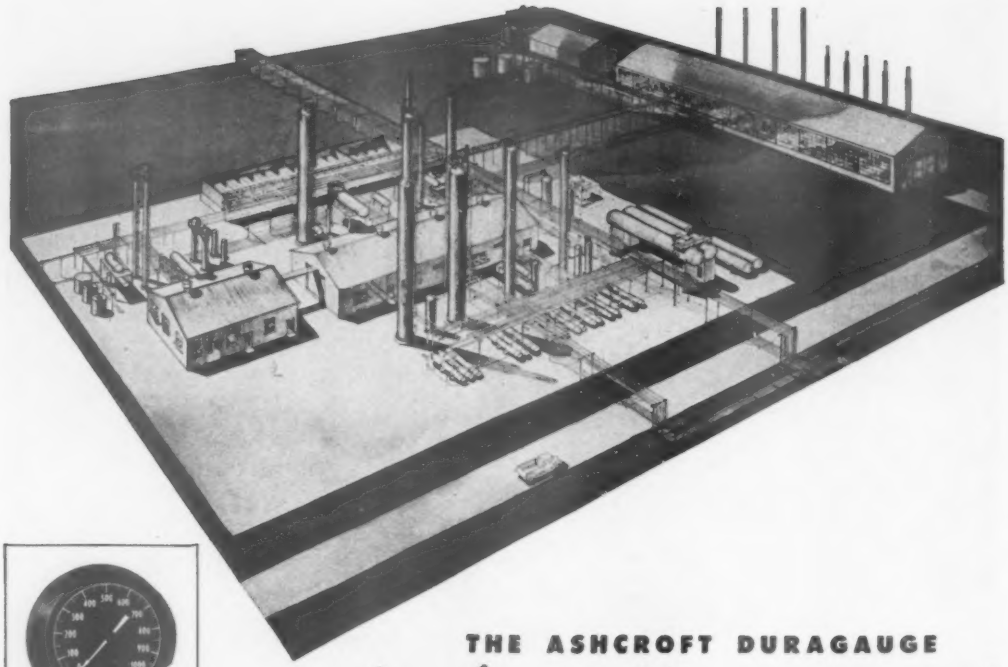
Progress Through Chemistry

THE DAVISON CHEMICAL CORPORATION

Baltimore 3, Maryland

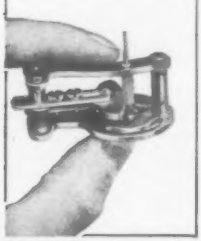
PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS, SILICOFLUORIDES AND FERTILIZERS


It's better to get
all your valves
from ONE source
POWELL



DURAGAUGE SPECIFIED!

Ashcroft Duragauges are installed in The Pure Oil Company's Crude Stabilization and Gasoline-LPG Recovery Plant at Worland, Wyoming. Contractor: C. F. Braun & Co., Alhambra, California.



THE ASHCROFT DURAGAUGE

...tough, sensitive, accurate!

The Ashcroft Duragauge has a performance record second to none. Long life in "killing" services in refineries, chemical plants, and power stations prove it.

Ashcroft engineers made the Duragauge the standard of industry by discarding traditional theories about pressure gauge construction. They developed a movement with *nylon* pinion gear and bearings.

The Nylon Movement* is light, strong and dimensionally stable. Friction and wear are minimized, corrosion resistance is increased. Shock impact absorption is high. Maintenance is reduced. Overall advantages: greatly improved indicating sensitivity and sustained accuracy. The Duragauge, with Nylon Movement, outlasts all others.

The petroleum industry is faced with demands for increased defense and civilian production. The Duragauge can help assure uninterrupted operation. Get all the facts from your Ashcroft Distributor. Let him help you select the right Duragauge for *your* plant.

* Patented

ASHCROFT GAUGES

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'HANCOCK' VALVES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

UNIBOLT X-BEANS

put needle valve selectivity in your positive choke...

74 sizes of X-Beans up to ½ inch

Because UNIBOLT X-Beans are drilled in increments of 5 per cent and 10 per cent of well flow rather than in increments of 1/64-inch in orifice size, the flow of fluid or gas from a well can now be positively controlled with a degree of accuracy never before attained. Say, for example, a well produces 100 bbls. through a 1/64-inch choke. To increase the choke to the next largest fractionally drilled size, 2/64-inch, would increase the production to approximately 400 bbls. On the other hand, a well that produces 100 bbls. through a size X-35 UNIBOLT X-Bean would produce only 105 bbls. through the next largest size X-Bean, X-35.5; 110 bbls. through an X-36, and so on. Here is positive protection against harmful over-producing a well in order to make its allowable, as is sometimes done through an adjustable choke.

UNIBOLT X-Beans are available in economical, renewable inserts in sizes up to X-40.5 (13/64-inch). Larger beans are standard full 6-inch length, drilled full length.

UNIBOLT Positive Choke Bodies and Cage Nipples accommodate either X-Beans or regular beans, and the Positive Choke Body may be easily converted to a Wing Valve or Adjustable Choke.

only UNIBOLT choke bodies and cage nipples accommodate X-BEANS

THORNHILL-CRAVER COMPANY

P. O. BOX 1184 HOUSTON, TEXAS

CORROSION affects every plant in the Petroleum Industry

MILLIONS OF DOLLARS ARE LOST ANNUALLY

1 Your Hard-to-Get Equipment

. . . may be ruined by constant attack of acids, alkalies, fumes, chemicals, moisture, gases and weathering.

2 Your Valuable Products

. . . are subject to contamination and loss whenever they are in contact with corroded surfaces.

3 Expensive Shutdowns

. . . and loss of production with costly man-hours for repairs may be incurred unnecessarily.

4 Your Profits

Ruined equipment, contaminated products, the loss of production and repair expense caused by shutdowns mean only one thing . . . reduction in *your* profits!

RIGHT NOW . . . you should investigate the economies of using Amercoat; a *line* of coatings built to protect against *specific* industrial corrosion hazards.

Our field engineers are available . . . without obligation . . . to check your plant for corrosion problems . . . and to give you *specific* recommendations.

AMERCOAT CORPORATION

They Say—

Start of the Great Crusade

Cartoon by Fitzpatrick; reprinted with permission of the St. Louis Post-Dispatch.

Shocked Shreveporter

"Governor Adlai Stevenson's endorsement of President Truman's veto of legislation giving to the coastal states ownership and control of their respective tidelands is, indeed, shocking . . . in view of previous declarations by the governor of Illinois for States Rights . . .

"In his statement endorsing abrogation of states' rights in the tidelands case, Governor Stevenson tells the people he bases his position on a Supreme Court decision, which sets forth that the federal Government has 'paramount rights' in the tidelands.

"What piffle!

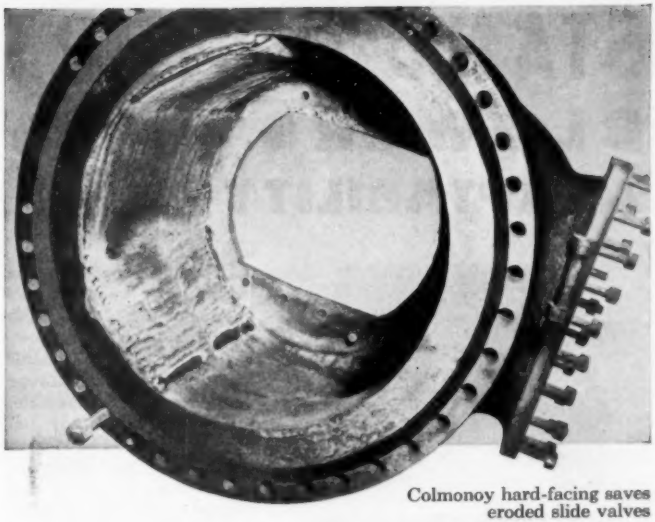
"Uncle Sam, of course, has 'paramount rights' in everything and everybody in the entire nation. But invocation of such 'paramount rights'—particularly when such invocation represents invasion of the liberty and freedom guaranteed our people under the Constitution—should be permitted only in cases of dire national emergency."

Editorial in the Shreveport Journal.

Difficult Fishing Trip

"W. Alton Jones, the American oil executive who mysteriously and sensationally showed up in Teheran a few days ago, is fishing in very troubled waters . . .

"If Mr. Jones or anyone else can give the Iranians useful, disinterested advice on how to get their oil production, and especially the refinery at



Colmonoy hard-facing saves eroded slide valves

Service Life is Extended 500% with COLMONOY No. 1 Hard-Facing

The catalyst slide valve shown here was the badly eroded property of a large western refinery. The interior wall had suffered severe erosion, to a depth, in some places, of over a quarter inch. The valve gate had lost 3/16" as well. The job for hard-facing: to reclaim and extend service life.

The refinery maintenance men knew that COLMONOY No. 1 electrodes would do this easily, and even more important, that this COLMONOY alloy would keep the valve *out* of their shop and *in* service longer than anything else could. Their estimate, based on experience with COLMONOY, was that they wouldn't be seeing that valve again for at least two years. The picture of the valve body, above, shows the application of COLMONOY No. 1.

The slide valve gate was preheated and then maintained at 350-400° F. COLMONOY No. 1 welds fast and easy.

COLMONOY stands for a complete line of hard-facing alloys. Only a complete line can meet the various challenges of impact, abrasion, and corrosion, either singly or in combination. COLMONOY alloys come in forms to suit any application: rod, paste, powder, wire, and castings.

Write for general literature or tell us of your particular problem for more detailed information.

Branches: Long Island City, Buffalo, Chicago, Houston, Los Angeles, Montreal.

ORDER FROM YOUR LOCAL JOBBER

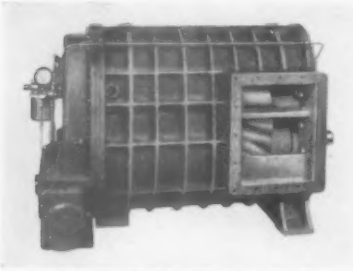
WALL COLMONOY

CORPORATION

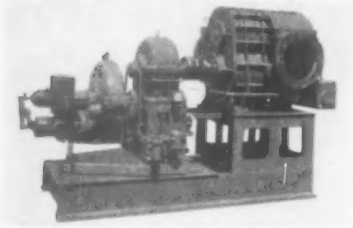
HARD FACING ALLOYS

19345 JOHN R STREET DETROIT 3, MICHIGAN

STANDARDAIRE
BLOWERS *for easy*
ADAPTABILITY



Standardaire Blower with side intake and discharge.



Standardaire Blower with turbine and gear drive unit.

Standardaire Blower with side intake and end discharge.

To meet the specific needs for industry, Standardaire's unique design provides for maximum flexibility in meeting unusual requirements for intake and discharge connections. For example, the blower intake or discharge ports can be located on the end, top, bottom or sides···· two intake or discharge ports may also be provided when necessary. These exclusive features, plus provisions for direct drive by a power unit of your choice, are typical examples of Standardaire's adaptability.

Standardaire Blower with single top intake and two side discharge ports.

Installation showing three Standardaire Blowers.

Write . . .

Read Standard Corporation, Dept. F-36
370 Lexington Ave., New York 17, N.Y.
BLOWER-STOKER DIVISION

AXIAL FLOW STANDARDAIRE BLOWER

READ STANDARD
CORPORATION

NEW YORK · CHICAGO · YORK · LOS ANGELES

Abadan, going again, it will be to everybody's benefit, including the British. It stands to reason, too, that anything done to ameliorate Iran's appalling economic and fiscal situation will help the free world as well as that unhappy and misguided country. However, it must always be kept in mind that the legal, moral, political and economic factors are such as to make an arrangement without British consent dangerous and even reprehensible."

Editorial in New York Times.

Stevenson on Tidelands

"I stated publicly, both in Houston and Dallas, that the base from which I must necessarily start is the Supreme Court decision holding that the paramount interest in oil discovered beneath these submerged lands is vested in all the people of the United States.

"I accept and abide by this ruling in common with all Supreme Court decisions.

"The present question, therefore, is one of wise national policy in the disposition of national assets; and it does not seem wise to me to set in motion a practice of blanket cession of these or any other national assets to the individual states. I agree, therefore, with the President's veto."

Statement by Gov. Adlai E. Stevenson in Springfield, Ill., following a conference with Gov. Allan Shivers of Texas.

CALENDAR

SEPT.

22-24 American Society of Mechanical Engineers, petroleum engineering conference, Hotel President, Kansas City, Mo.

25-26 Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo.

29-30 American Association of Oilwell Drilling Contractors, annual meeting Skirvin Hotel, Oklahoma City.

OCT.

1- 3 American Institute of Mining and Metallurgical Engineers, Mid-Continent fall meeting, Rice Hotel, Houston.

1- 3 National Association of Corrosion Engineers, South Central Region, technical program and committee meetings, Jung Hotel, New Orleans.

2-3 Petroleum Electric Power Association, annual conference, Mayo Hotel, Tulsa.

4- 5 New Mexico Geological Society, annual field conference, Santa Fe.

4 John Zink Process Heating seminar, John Zink Co. plant, Tulsa.

6 Independent Natural Gas Association of America, annual meeting, Fontenelle Hotel, Omaha, Neb.

6 Natural Gasoline Association of America, school on low temperature fractional analysis of petroleum gases and liquids, University of Oklahoma, Norman.

RECOVER*

***WEBSTER:** *To get again; win back; regain, as lost property or health. To make up for; retrieve; as to recover losses.*

Remember the not-so-long-ago "olden days" when condensate was recovered by conventional separation and weathered in the stock tank? . . . inefficient, wasteful, profit eating!

Today recovery is made by stage separation, with low temperature separation systems becoming increasingly popular. Currently the BS&B Glycol Injection Low Temperature Separation System is proving itself time and time again as a means of profitably extending and increasing the recovery advantages of conventional LTS. These are the strides that have made it possible to recover more and a better grade of condensate from gas. But – the increased recovery has created a problem: "How to *hold on* to all this increased production!" That's why, today, more and more operators say: "The method of *recovering* this condensate in the stock tank–and keeping it there–is the BS&S Stabilizer!"

In this tall, magical distillation column two things happen that materially increase your profits. The light, wild hydrocarbons – methane, ethane and propane – are directed to sales, adding BTUs to your sales gas, the medium and heavy hydrocarbons go to storage. This means these light hydrocarbons do not reach the stock tank, vanish, and strip the medium, "easily influenced" hydrocarbons, butane, and pentane – with them. After being cooled to atmospheric temperature the condensate discharged from the stabilizer to the stock tank is "dead". That which you've recovered, you keep!

Wouldn't *you* like to *keep* more of your production profits, too? Then investigate now how a BS&B Stabilizer can stop that profit-wrecking stock-tank shrinkage.

Usually, shrinkage savings alone soon pay for the equipment. Call your BS&B Field man in – today!

Patent Pending

BS&B STABILIZER

Increases Stock Tank Recovery Without Producing Additional Reservoir Fluid

Making 50 or More Barrels of Liquid Per Day?

If your separator system is doing this you should investigate and invest in the BS&B Stabilizer.

BLACK, SIVALLS & BRYSON, INC.
Oil & Gas Equipment Division, Department 1-A9
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9-10	California Natural Gasoline Association, twenty-seventh annual fall meeting, Ambassador Hotel, Los Angeles.
12-18	Oil Progress Week.
13-15	Texas Mid-Continent Oil and Gas Association, thirty-third annual meeting, Hotel Texas, Fort Worth.
13-17	American Institute of Electrical Engineers, fall meeting, New Orleans.
16-17	Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.
16-19	Permian Basin Oil Show, Odessa, Tex.
20	Texas Independent Producers and Royalty Owners Association, mid-year directors' meeting, Austin.
20-23	Society for Non-Destructive Testing, Inc., annual meeting, Hotel Sylvania, Philadelphia.
22-24	Society of Automotive Engineers, national transportation meeting, Hotel William Penn, Pittsburgh, Pa.
23-24	American Institute of Mining and Metallurgical Engineers, petroleum branch, West Coast fall meeting, Statler Hotel, Los Angeles.
23-24	Independent Petroleum Association of America, annual membership meeting, Skirvin Hotel, Oklahoma City.
24	Institute of Gas Technology, annual meeting, Chalfonte-Haddon Hall, Atlantic City.
24	Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.
27-28	Society of Exploration Geophysicists, Eastern Canada meeting, King Edward Hotel, Toronto, Ont.
27-31	American Gas Association, annual convention. Atlantic City, N. J.
30-31	American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, annual fall meeting of Pacific sections, Statler Hotel, Los Angeles.
30-Nov. 1	Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

NOV.

3- 4	Society of Automotive Engineers, national diesel engine meeting, Chase Hotel, (tentative), St. Louis, Mo.
5- 7	Industrial Management Society, 16th annual time and motion study and management clinic, Sheraton Hotel, Chicago.
6- 7	Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
6- 8	Gulf Coast Association of Geological Societies, annual fall meeting, Hotel Driscoll, Corpus Christi, Tex.
8-13	Oil Industry Information Committee, Conrad Hilton Hotel, Chicago.
10-13	American Petroleum Institute, thirty-second annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
13-14	Society of Exploration Geophysicists, midwestern meeting, Texas Hotel, Fort Worth.
17-18	American Institute of Electrical Engineers, subcommittee on electrically operated recording and controlling instruments, technical conference, Benjamin Franklin Hotel, Philadelphia.
20-22	Instrument Maintenance Short Course, jointly sponsored by Southern California Meter Association and Los Angeles Harbor Junior College.
21	Natural Gasoline Association of America, district meeting, Herring Hotel, Amarillo, Tex.

30-
Dec. 5 American Society of Mechanical Engineers, Statler Hotel, New York City.

DEC.

1- 3 New Mexico Oil and Gas Association, annual meeting, Albuquerque.

1-6 American Society of Mechanical Engineers, twentieth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.

5- 6 Interstate Oil Compact Commission winter meeting, Wichita, Kans.

7-10 American Institute of Chemical Engineers, annual meeting, Hotel Cleveland (Hqs.) and Carter Hotel, Cleveland.

1953

FEB.

2- 4 Missouri Petroleum Association convention, President Hotel, St. Louis.

27 Natural Gasoline Association of America, regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

2- 6 American Society for Testing Materials, spring meeting, Statler Hotel, Detroit.

4- 6 American Petroleum Institute, division of production, Southwestern district spring meeting, Hilton Hotel, Fort Worth.

8-11 American Institute of Chemical Engineers, Buena Vista Hotel, Biloxi, Miss.

15-17 American Petroleum Institute, division of production, Eastern district spring meeting, William Penn Hotel, Pittsburgh.

16-20 National Association of Corrosion Engineers, Hotel Sherman, Chicago.

18-20 American Petroleum Institute, division of production, Mid-Continent district meeting Mayo Hotel, Tulsa.

23-26 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists, annual meeting, Rice and Shamrock Hotels, Houston.

30-31 Texas Independent Producers and Royalty Owners Association, annual meeting, San Antonio.

30-
Apr. 1 Mid-West Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

APR.

8-10 American Petroleum Institute, division of production, Eastern district meeting, William Penn Hotel, Pittsburgh.

21-23 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

27-28 Independent Petroleum Association of America, mid-year meeting, Jefferson Hotel, St. Louis.

Apr. 29-
May 1 Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

MAY

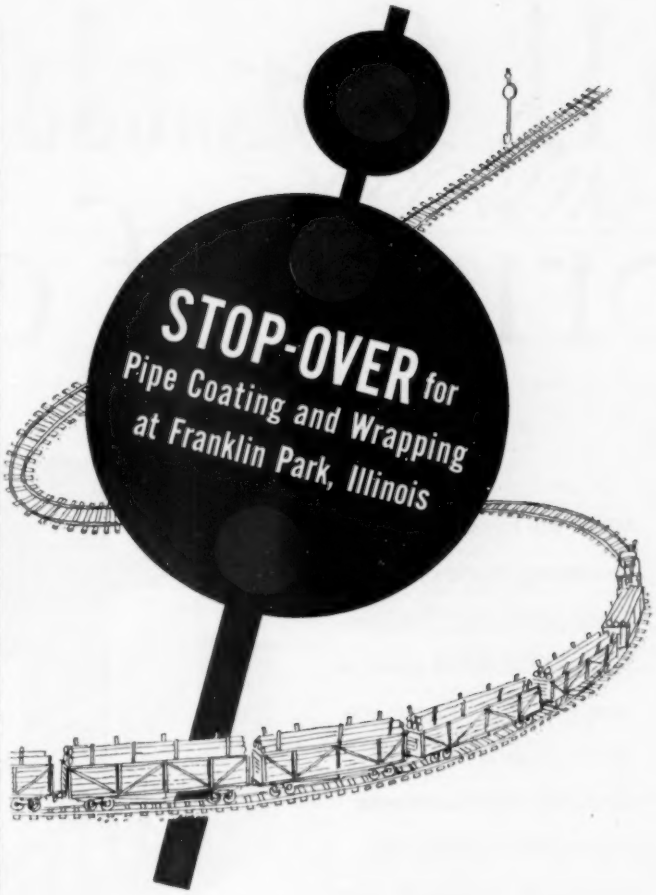
4- 5 American Petroleum Institute, division of marketing, midyear meeting, Baker Hotel, Dallas.

11-13 Southern Gas Association, Jung Hotel, Hotel, New Orleans.

14-23 International Petroleum Exposition, Tulsa.

24-27 American Gas Association, production and chemical conference, Hotel New Yorker, New York City.

28-29 Natural Gas and Petroleum Association of Canada, London, Ont.



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THE OIL AND GAS

JOURNAL

TULSA, OKLAHOMA

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JOURNALLY Speaking

Tenacity and Confidence

ABOUT 3 years ago we told you on this page about a fellow up in Michigan who was looking for oil in the basement rocks.

Two years ago we told you the danger that oil would be found and the geology books would need rewriting was past. The well had been abandoned at 5,386 ft.

Well, Jacob Beck has taught us to quit prognosticating about his unusual well. He's also adding a new story to the tales about the perseverance of oil men. Beck has started drilling again—still in granite.

This is the beginning of the thirteenth year that Beck has been punching at the same hole with his cable-tool rig. The well was spudded in June 1940, and he's been at it off and on ever since.

Last week he was reported at 5,470 ft., which puts him 1,851 ft. into granite. While he hasn't yet set a record for drilling granite—at least one well has cut 3,000 ft. through an overthrust—he well may have established a new mark for drilling in basement rock.

Beck's wildcat is the Jacob Beck 1 Sancrant, located in Monroe County of southeastern Michigan. He's now drilling in the backbone of North America, the Canadian Shield, which he topped at about 3,500 ft.

Beck's explanation is simple. Geologists, with all their book learning, just aren't really hep to this business of oil finding. If they were, he asked a couple of years ago, why do their oil companies drill so many dry holes? As a case in point, he told of his own success in bringing in a sizable producer in an area which geologists had generally agreed could never produce oil.

His present location is another such case. Geologists have ruled out any possibility of deep production. Beck has proved them wrong once, and he's determined to do it again. Just how determined he is can be seen in his estimate that it's costing him $50 a foot to cut the rock he's now penetrating.

Perseverance isn't the only quality Beck possesses. He has confidence. He once wrote a local scout that there were only two men in the world with the ability to pick out a location and bring in a producer every time. He was one of them, he said, and the other was dead.

With the scout report in hand, and in view of Mr. Beck's tenacity, confidence, and willingness to put hard dollars into his digging, we're off the scoffers' bench. We'll wait until he actually abandons his test or finds oil before we take at face value everything the geologists tell us.

Cause and Effect

Routine events in the oil industry sometimes wind up with unexpected results.

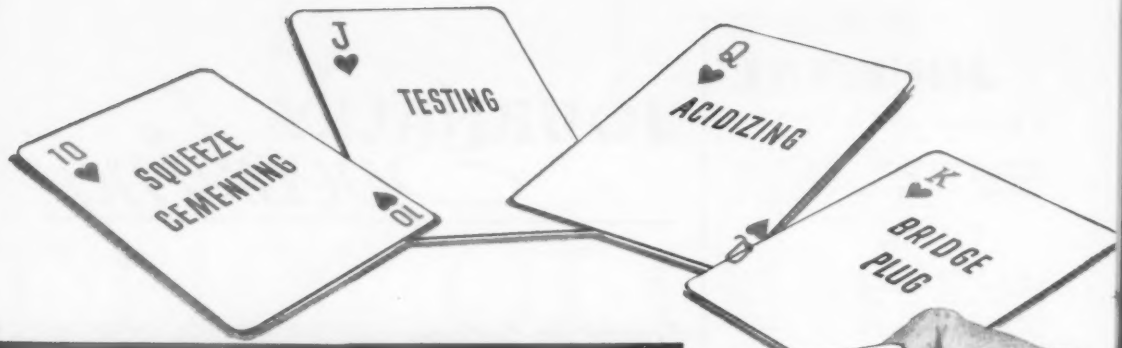
It seemed a reasonable thing not long ago when Saudi Arabia's King Ibn Saud announced he was lifting the head tax on Moslems making the annual pilgrimage to Mecca. The country's share of the income from oil produced by Arabian American Oil Co. was such that it no longer had to depend for its revenue on the $100 per person religious levy.

But what the King didn't figure on was what the free nature of the trip would do to the tourist trade. Two days before the climax of events at the birthplace of Mohammed, the airport at Beirut, Lebanon, was flooded with 9,000 stranded pilgrims.

In desperation, the Lebanese Government appealed to the U.S. Air Force to lend a hand. It responded by sending 13 C-54's, and in the unusual airlift it moved the excess pilgrims to Jidda, the seaport 40 miles from Mecca.

And it all happened because of what oil and free enterprise have done for the once backward and underprivileged desert kingdom.

Ted Armstrong



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SETS EASILY—HOLDS POSITIVELY The Baker Cement Retainer can be set accurately, readily and securely at any desired point. It maintains a leak-proof pack-off under any pressure which can safely be imposed on the casing, and permits placing cement, acid, or other fluids at any predetermined point behind the casing or liner; around the shoe joint; or into the open hole below.

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USED ALSO AS BRIDGE PLUG The Baker Cement Retainer can be converted into a casing bridge plug for setting on tubing, or better yet, on an electrical conductor cable. You can save wear and tear on precious tubing by calling your choice of the leading wire line service organizations—or ask any Baker representative or office for details.

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BAKER Model "K" CEMENT RETAINER

An owners' union why not?

CONTEMPORARIES serving other industries, plagued by labor difficulties, are giving thought to the possibilities of organizing owners into unions and protecting their interests in the usual Washington-approved manner.

Some of the editors would go the whole distance. They would adopt the closed shop and any shareholder who refused to join would have his stock confiscated. They would have the owners move in whenever they felt that the prices of an industry were inadequate and shut down all facilities until they got what they wanted.

This proposal of fighting fire with fire may give some satisfaction in contemplation but the editors well know that is as far it can go. While labor is fully protected in such matters, the owners would quickly find themselves athwart the law at many points with injunctions, damage suits, and probable jail sentences along with public condemnation which in the case of owners could not be ignored.

But the proposals for owner organizations, minus the fire, have merit.

CERTAINLY we don't need more pressure groups. We are where we are in Government because much of our key legislation comes from trading arrangements among these organizations with the result that long-range majority interests are sacrificed to satisfy the immediate demands of powerful minorities.

What we have in mind is an association of shareholders and other equity owners who would present their position factually and fairly in labor matters and other crises as they arise.

It is still customary in some quarters to picture the owners as being wealthy individuals who can be ignored in matters pertaining to labor demands, higher taxes, price controls, and other developments affecting net revenues.

SUCH is not the case. The large shareholder is a rarity. In the oil business exclusive of retail stations, shareholders outnumber employes. Women shareholders, partially or wholly dependent on dividends, represent a large percentage of the total.

University and other endowments, retirement funds including those for employes, investment companies with the savings of tens of thousands, church and hospital funds, and literally millions of small investors across the country are equity owners of oil companies and other successful enterprises requiring large capital.

Over the past decade increases in dividends have been less than the advances in wages and salaries and less than the increased cost of living. Owners are rapidly becoming the forgotten hub of our industrial wheel. Any organizational effort that will change this trend will be a necessary contribution to the solution of basic problems ahead.

Control

● Nothing takes the place of the Driller's know-how . . . but as an aid to know-how, the driller has the benefit of precision instruments and modern equipment, to *control* operations and assure successful, trouble-free completions.

Same thing applies to cement: The Burner, for example, with his long years of experience, has the most modern devices at his finger tips, to *control* his operation and assure the production of cements with the uniformly high quality that means trustworthy performance . . . cements that produce trouble free cementing jobs when the casing is swung into place.

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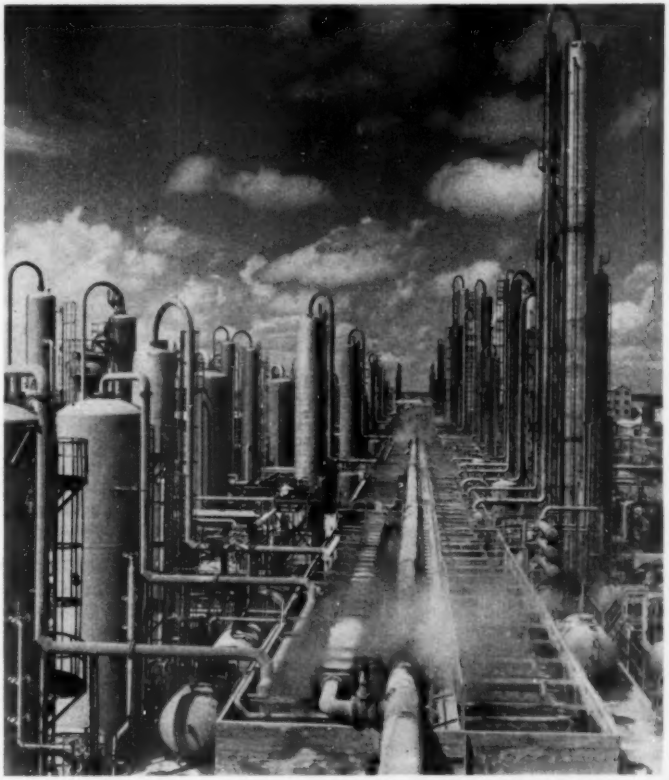
SELECT CEMENT TO FIT THE JOB

THIS WEEK

REFINING.—Coming jet-fuel market is open to all refiners, regardless of size, N.P.A. is told by government-industry panel. . . . Demand estimated at 5 to 20 per cent of avgas demand through 1962. . . . Wartime quality set at 75 to 80 per cent motor gasoline, rest kerosine, with peacetime requirements less stringent. . . . ¶PAD approves rapid tax amortization, steel allocation for Indiana Standard's proposed Williston basin refinery at Mandan, N. D. . . . ¶Ten-week strike at Frontier's Cheyenne refinery ends. . . . New agreement guarantees strike-free operation until June 1, 1953. . . . Shell announces development of new fractionating plate which does away with bubble caps. . . . Company claims use of new tray results in lower pressure drop, greater vapor capacity. . . . Cost savings said to be 50 per cent in new columns, half as much as in old installations. . . .

INTERNATIONAL.—Iranian Government withholds official rejection of latest British-United States proposal for settling the oil-nationalization dispute. . . . Some quarters think Mossadegh is stalling in hopes that still better terms might be forthcoming. . . . ¶Geologists familiar with Mexican oil developments believe that Pemex' Ezequiel Ordonez field ranks as one of the most significant discoveries in the country since 1938. . . . ¶British say FTC "cartel" report was extremely ill-timed. . . . Unofficially they worry that furor raised by the report may have detrimental effects on foreign operations in general, in which their stake is nearly as large as that of the United States. . . . ¶Mediterranean Oil Co. will begin drilling soon on two Sicilian tests. . . .



NEW INDUSTRIAL GIANT is the petrochemicals industry, which already produces 25 per cent of all chemicals made and which, in the opinion of a leading industry authority, will be making half of all chemicals produced 10 years from now. The towers and atmospheric coolers shown here are a part of the Bishop, Tex., plant of Celanese Corp. of America, on which an article will appear in the September 22 issue of the Journal.

"CARTEL."—Mutual Security Agency turns over to the Department of Justice its records on ECA-financed purchases of oil from Kuwait for possible civil action against Gulf, Socony-Vacuum, and Atlantic Refining. . . . These suits if filed would be for alleged overcharges and would resemble the three brought last month against Jersey Standard, California Standard, Socony-Vacuum, and Texaco. . . . ¶Special grand jury investigation of the oil industry is put off until October 3, when company documents subpoenaed by the Justice Department must be submitted. . . .

TRENDS.—Total well completions for the year through September 6 were 1,941 greater than for same period last year. . . . A weekly average of 766 completions for the remainder of the year will bring the year's total up to the 1951 level. . . . Only 843 wells per week will be required to reach the Journal's midyear forecast for 1952. . . .

ACTIVITY.—Production of crude and lease condensate average 6,432,225 bbl. daily for week ended September 6, up 150,700 bbl. daily. . . . ¶Total well completions declined to 775 from 852 for the previous week. . . . Wildcat completions were up 18 wells for the week to 212. . . . ¶The second weekly increase in rotary rigs operating in United States brought the total to 2,407 on September 8.

EXPLORATION.—George Vasen cements 5-in. liner at 20,337 ft. in the world's deepest active test. . . . This is almost 580 ft. deeper than pipe has ever been run and set. . . . Amerada brings in North Dakota's fourth oil discovery. . . . The well, Amerada 1 North Dakota "D," apparently opens a new field in the Charlson area midway between Croff and Beaver Lodge fields along the Nesson anticline.

STEEL.—PAD allocates 510,050 tons of line pipe for fourth-quarter construction. . . . Crude and products lines given 205,669 tons, gas lines 304,381 tons. . . . Allocations will permit completion of several major trunk lines. . . . ¶OPS prepares to release order permitting steel manufacturers to pass on, without pyramiding, increased costs resulting from strike-won wage boosts. . . . Effect will be to increase sharply the cost of casing, tubing, and other tubular goods. . . .

What of Jet Fuels?

Some answers to questions of how much and what quality will be required are given refiners in N.P.A. symposium

George Weber

ATLANTIC CITY. — Many refiners are today looking at the jet fuel market and wondering whether to get into it.

Its future specifications and demand raise numerous questions. Some of these questions, but not all of them, were answered last week in a symposium conducted at the fiftieth annual meeting of the National Petroleum Association. A panel of six members representing government, military, aircraft, and oil interests presented a thorough picture of what is now known—and not known—on the subject.

The consensus was that the new market is open to all refiners. Unlike aviation gasoline, which requires extensive processing facilities, jet fuels can be produced and blended in the average refinery.

More refiners wanted . . . The active interest of the smaller refiner was invited by Maurice Granville, assistant director of refining for the Petroleum Administration for Defense.

"While we have a large potential production for jet fuel, we do not have enough refiners equipped to blend jet fuel today," he said. There are now about 70 plants producing jet fuel and the properties vary widely.

"More refiners, especially those in coastal areas, should install equipment to segregate naphtha and kerosine fractions for use in blending jet fuel. Requirements for jet fuel have increased rapidly during the past year and are continuing to increase at a faster rate than any other military petroleum product. Current procurement by the military and by the engine manufacturers is approximately 100,000 bbl. per day, and it is evident that these requirements will continue to increase for some time to come."

Commenting on supply problems, Granville said:

"1. We are using the knowledge and resources of the industry to determine the relationships between jet fuel specifications and jet fuel availability.

"2. Studies of jet-fuel availability must consider the need in wartime to maximize jet-fuel production at strategically located refineries.

"3. The properties of wartime jet fuels will cover a wider range than those of peacetime jet fuels.

"4. It is essential that wartime type jet fuels be available for engine-development work.

"5. Mobilization-period jet-fuel requirements are increasing rapidly."

Small refiner's view . . . A small refiner's viewpoint was presented by Dr. W. F. Krause, chief chemist for Globe Oil & Refining Co., Lemont, Ill.

Getting into the jet-fuel program gives the independent refiner a better diversification of products and opens new markets. Should a national emergency arise, participation should assure a continued crude supply and aid for expansion and improvement of refining facilities.

By diverting low-octane straightrun gasoline and naphtha to jet fuel, the small refiner could improve the octane level of his gasoline. Further, participation now gives the refiner a head start on supplying jet fuel for commercial air lines when that new future market develops, Krause said.

Existing facilities in most small refineries are sufficient to make jet fuel, Krause said. No special treating is required. Inspection tests are relatively simple.

However, the refiner must be particularly careful to isolate his blending and storage facilities for jet fuels to insure against contamination of that important aircraft fuel by other products.

How much? . . . Should a global war develop, the enormous consumption of jet fuel will require that practically all refiners blend that product.

Wartime jet fuels will contain from 75 to 80 per cent of motor gasoline and the remainder will be largely kerosine. The need will be met largely by diverting fractions from nonessential motor gasoline.

But what is the projected market short of war? J. Bennett Hill of Sun Oil Co., Marcus Hook, Pa., stated that the day of jet fuel for commercial aircraft is coming, but not so far or in such volume that the petroleum industry cannot take it in its stride.

The shift in this country will probably not be important quantitatively by 1957, said Hill. For 1962, the opinions on probable jet-fuel consumption vary from 5 per cent to 20 per cent of the avgas demand.

Assuming 15 per cent as a fair estimate, we therefore arrive at a jet-fuel demand of 1.1 million barrels in 1957 and 4.8 million barrels in 1962. Conservative estimates of our crude production in these two years are 2.6 billion barrels in 1957 and 2.8 billion barrels in 1962. The jet fuel demand would therefore be 0.04 per cent of our crude in 1957 and 0.17 per cent in 1962.

What quality? . . . No one knows today what the ultimate specifications will be for a peacetime jet fuel. But it is increasingly evident that it will be a quality product, tailor made for the future jet combustor.

The research in jet-engine design today indicates that much further development will follow and the range of specifications for fuels may well narrow considerably.

For the nearer future, Dr. Carl W. Kelley of the Office of Petroleum Programs, Munitions Board, discussed at length the probable quality of wartime jet fuel.

"Under peacetime conditions," said Kelley, "only small quantities of jet fuel will be required. Under these circumstances, the majority of refiners will make a fuel to the specification in the easiest possible way, which usually involves the blending of available commercial products.

"In most cases therefore, the refiner will take those stocks least valuable to him as a motor fuel and either his current production of No. 1 fuel oil or kerosine. The blending of such products will result usually in a fuel having a relatively low end point, low bromine number, low aromaticity, etc. Cracked gasoline stocks will not be generally used, inasmuch as they have more value than straightrun stocks in motor gasoline blends.

"Under wartime conditions, it is anticipated that the demand for jet fuel will be extremely high and will require ingenuity on the part of the refiner to maximize production by including various quantities of cracked gasolines and cracked fuel oil fractions.

"These will tend to increase bromine number and aromatics toward the limit of the specification, to increase gum content, sulfur content, and boiling range, and to decrease gravity and heat of combustion. It is, therefore, important that engines designed for wartime use be built to handle the wartime fuel and not the easier-to-handle type of fuel available commercially in peacetime."

EXHIBIT AREA at the Seventh National Instrument Conference and Exhibit in the Cleveland Public Auditorium. Value of the equipment on display was in excess of $10,000,000. Approximately 28,000 sq. ft. of exhibit space was devoted to 273 exhibit booths. There were 198 participating companies.

Column Flooding Solved

Force-balance pressure transmitter can be used to detect it, insure safe distillation at maximum load, I.S.A. told

Gerald L. Farrar

CLEVELAND.—Flooding of distillation columns can be detected by pressure-drop measurements through the use of a force-balance pressure transmitter.

This development was revealed here last week by Gordon W. Swinney, of Phillips Petroleum Co., Phillips, Tex., in a paper presented before the seventh annual National Instrument Conference and Exhibit sponsored by the Instrument Society of America.

Up to now, Swinney told the session on Instrumentation for Production Processes, the lack of a way to anticipate column flooding has made it difficult or even impossible to operate a column safely at maximum load—the point of greatest economy.

The development is particularly significant for so-called "superfractionations," in which extremely close and accurate separations of highly pure hydrocarbons are made, he pointed out.

How flooding is detected . . . As vapor or liquid flow to a column is increased, pressure drop across the column increases slowly and uniformly until the flooding point is reached, Swinney said. At this point column pressure drops suddenly.

The difficulty in detecting flooding lies in the measurement of the drop in column pressure. This drop is usually within a span of 0 to 20 psi., with the normal value running from 10 to 15 psi. This pressure is measured at the operating pressure of the column, he said, which may run any where from 10 to 1,000 psi. or more.

The force-balance pressure transmitter is so constructed that it measures a narrow range of 0 to 20 or 0 to 40 psi. It can be changed readily within these over-all limits, Swinney said. The narrow range of measurement over the full range of the instrument provides accurate measurement and reading of pressure changes of ½ psi. Detection of any small pressure change is assured.

Easily installed . . . The transmitter is easily installed, Swinney said. The instrument, a blind type, is small and compact and requires no additional housing. The pressure-point connection is small and is not subject to freeze-ups—thereby eliminating the necessity to install additional equipment to provide protection for winter-time operation.

Differential and spring-type instruments ordinarily used for pressure measuring are not satisfactory for detecting column flooding due to the pressure range involved, excessive installation costs, or because they lack the required sensitivity throughout the operating range, Swinney said.

Sessions and papers . . . More than 100 technical papers were presented during 27 technical sessions of the society.

In addition to these sessions and the equipment exhibit, four engineering and scientific societies conducted technical meetings at the conference. They were the Industrial Instruments and Regulators Division of the American Society of Mechanical Engineers, the Instruments and Measurements Committee of the American Institute of Electrical Engineers, the Institute of Radio Engineers, and the American Institute of Physics.

Preceding the conference, the fourth preconference Instrument Mechanic's Maintenance Clinic, conducted under I.S.A. auspices, was held at Case Institute of Technology in Cleveland.

Over 400 instrument mechanics were given 20 hours of instruction on "trouble shooting," instrument repair, and instrument maintenance and installation.

Analysis clinic . . . A clinic on analysis instrumentation also was held un-

I. S. A. DIGNITARIES attending a special instrument-industry luncheon in the Cleveland Public Auditorium which officially opened the Seventh National Instrument Exhibit. Left to right are Kenneth Andersen, executive vice president of the Scientific Apparatus Makers Association; Porter Hart, superintendent of instrumentation of Dow Chemical Co., Freeport, Tex., and new president of I. S. A.; Howard A. Pringle, director of the scientific and technical equipment division of the National Production Authority; and Dr. A. O. Beckman, of Beckman Instruments, Inc., Pasadena, Calif., and immediate past president of I. S. A.

der the sponsorship of I.S.A. during the conference. It consisted of lectures and demonstrations on complex analytical instruments which have been or may be adapted for use in process control. Some of the instruments were:

1. Infrared absorption-type plant-stream analyzer.
2. Flame spectrophotometer.
3. Mass spectrometer.
4. Thermal-conductivity gas analyzer.
5. Combustible-gas and oxygen analyzers.
6. X-ray spectrometer and X-ray fluorescence analyzers.
7. Double-beam infrared spectrometer.
8. Differential refractometer.
9. Recording spectrophotometer.

Smaller Tools Needed

Geophysical prospectors turning to durable, more compact equipment for surface exploration, Segesman tells I.R.E.

CLEVELAND.—The trends in instrumentation for surface geophysical exploration is toward small and rugged tools, Francis F. Segesman said here last week.

Segesman, of Schlumberger Well Surveying Corp., spoke to a meeting of the Institute of Radio Engineers, held in conjunction with the seventh National Instrument Conference on "Electronics in Geophysical Instrumentation."

Surface exploration methods . . . The mobile magnetometer, usually referred to as the air-borne magnetometer, is a flux-gate type of instrument which depends for its high sensitivity on the saturation of a high permeability core, Segesman said.

The sensing element of such an instrument, in contrast to the stationary-type magnetometer, is well adapted for mobile operation and has made possible the rapid plotting from aircraft of magnetic intensities over large areas, he said.

Scintillation counter . . . The recently developed scintillation counter may to a large extent replace the less-sensitive and less-efficient Geiger counter, Segesman said.

This new type of counter depends in its operation on the fact that crystals of certain substances, such as anthracene and naphthalene, emit flashes of visible or ultraviolet light when exposed to ionizing radiation. These flashes are detected and amplified in a photomultiplier tube. Resulting pulses are further amplified and counted, he continued.

The greater efficiency of the scintillation counter may be traced to the fact that it is 100 times more sensitive to gamma rays than is the Geiger counter, he said. The cosmic-ray background (which interferes with Geiger counter results) becomes negligible in the scintillation counter, due to its strong gamma-ray response.

Subsurface conductivity measurement . . . Instruments for geophysical surface prospecting must be easily transportable, sometimes on the back of the prospector, Segesman said. In a recently developed low-frequency electromagnetic system for measuring subsurface conductivity, an alternating magnetic field is transmitted into the earth from a large horizontal coil carried by one man.

The field produced by the induced eddy currents in the earth is detected by another similar coil carried by a second man. The associated electronic equipment is likewise transportable, he said.

Improved radar . . . The Shoran radar-beacon system, currently in use for precise location of position in water-covered areas and in the air, is limited to line-of-sight operation, Segesman said. For this reason, it is expected that Shoran may be displaced for geophysical use by lower frequency CW systems, such as Decca, Raydist, or Lorac. These give essentially the same location accuracy as Shoran at greater operating distances.

Well logging . . . It is economically desirable that the logging apparatus used for oil-well holes be capable of making two or more different kinds of measurements, simultaneously or consecutively, Segesman said. The time the drilling rig is idled is costly, and a minimum number of trips should be made in the hole with the measurement cable.

It is, then, desirable to put as many circuits into the hole equipment as possible. Multiple use is made of some cable wires by passing simultaneously over them d.c. and a.c. current of different frequencies which can be separated at the cable terminals by suitable filters. Moreover, it is often possible to put complex control circuits in the hole unit, which, if located at the surface, would require the use of additional cable conductors, Segesman said.

Deep-hole problems . . . Diameters of standard-hole logging equipment must not be larger than about 4½ in., with 3⅜ in. a usual size. Too, the circuits in the deep-hole device must be protected from the large hydrostatic pressures, developed in a deep hole, by thick-walled steel housings, thus further reducing the limited available space, he said.

Another problem encountered in deep-hole logging is due to the high temperatures encountered in deep wells. Special emphasis must be placed on temperature compensation of circuits, and all components must be heat tested for performance at the expected temperatures. This is necessary if consistent performance is to be obtained, Segesman said.

New electronic cartridge . . . Typical of new developments in equipment for well logging is a new cartridge-shaped hole unit for deep-hole work. The assembly contains 15 subminiature vacuum tubes and three miniature tubes which act as the power supply. An oscillator, two two-stage amplifiers, one three-stage amplifier, two detectors, and a stepping relay constitute the remaining major equipment.

The relay, Segesman said, can be operated by remote control from the surface to put the cartridge on five different types of operation. The cartridge was built to operate at temperatures ranging up to 250° F.

Research Outlay High

CHICAGO.—The petroleum industry will spend $130 million in 1952 on research alone.

The oil business employs about 17,000 college-trained scientists and engineers.

Only the chemical industry with a total research expenditure of $250 million surpasses the oil industry.

These highlight figures were reported to the "Centennial of Engineering" convocation here last week by Dr. Gustav Egloff, Universal Oil Products Co.

The petroleum industry, Egloff told the nationwide engineering conclave, is moving ahead rapidly in volume of products, dollar expenditures, and technical know-how. With total gross assets of $33 billion, it ranks fourth in the United States. Only agriculture,

railroads, and public utilities are larger. This figure for petroleum does not include natural gas, which is rated separately as the sixth largest industry, with total investments in plants and equipment of $9 billion.

An expenditure of four billion dollars for increasing and improving facilities of the petroleum industry will be made in 1952. This amount brings the total capital expenditures since World War II to 19.7 billion dollars.

Petrochemicals' Gain

By 1962 they'll constitute half of all chemicals made, Egloff tells chemists; already they provide 25 per cent

CHICAGO.—The petroleum industry will have an even greater impact on the chemical industry in the future than it has had in the past.

At present, 25 per cent of the nation's entire chemical production is petrochemicals, and estimates show that 50 per cent will be petrochemicals in 1962.

The interdependence of the petroleum and chemical industries, however, is far greater than is indicated by petroleum's present or projected production of chemicals. In the production of gasolines, fuel oils, and lubricants, chemical processes are used for a larger part of its operations, and huge quantities of chemicals are used in every phase of the industry from drilling for crude oil to the stabilization of its products in storage.

These facts were detailed here September 9 at the Seventh National Chemical Exposition by Dr. Gustav Egloff, Universal Oil Products Co.

Relative size . . . The petrochemical industry is a vastly important, though small, segment of industry as a whole.

At present it is producing raw materials for 17 billion pounds of organic chemicals yearly. Dr. Egloff told the Chicago audience the investment in this new petrochemical industry has increased from $350 million in 1940 to over $2 billion, and even more widespread expansion is planned.

One company alone produces 350 different compounds from petroleum or natural gas. These raw materials are the sources for almost every type of organic chemical as well as about two-thirds of the ammonia and 5 per cent of the sulfur produced in the United States.

A newer and important result of the great growth of cracking is the production of gases for chemical conversion. The principal products are propylenes, the butylenes, propane, and the butanes. These gases are either converted to high-octane gasoline by auxiliary catalytic processes or to petrochemical products.

Propylene and butylene . . . As a chemical raw material, Dr. Egloff pointed out, propylene is basic for a wide variety of products.

Its major use is for isopropyl alcohol, which is converted to acetone, used as a solvent or as rubbing alcohol. About 95 per cent of the annual acetone production of 500 million pounds is thus derived. Propylene is also the basic material for synthetic glycerine, which now accounts for 50 million pounds per year or about 22 per cent of the total production. The byproducts of this process, allyl chloride and allyl alcohol, are intermediates for resins, allethrin, which is an insecticide, and the soil fumigant, D-D.

Egloff noted that propylene now is also polymerized to its tetramer, which is one of the basic chemicals for alkyl aryl sulfonate detergents. It is used to alkylate benzene for the production of cumene, which is important not only as a component of aviation gasoline but as the basis for a new process for phenol. This new process has the advantage over previous ones in that it requires no chlorine or sulfuric acid.

Another use of propylene in Egloff's listing is in the production of acrylic type resins commonly known as Lucite and Plexiglas. These are particularly important for use in transparent parts such as noses of airplanes and in materials which come in contact with human tissues such as dentures and bone splints. There are a host of smaller volume products derived from propylene. An interesting example is acrolein which is used commercially for the production of methionine, as essential amino acid.

The butylenes are the cornerstone of the synthetic-rubber industry as well as the basic material for butyl alcohols, which are particularly important as solvents. The butylenes are dehydrogenated to butadiene, which Egloff said comprises about 80 per cent of the components of GR-S rubber and which is an important constituent of specialty rubbers. Isobutylene is the major component of Butyl rubber, which has replaced natural rubber inner tubes. The synthetic rubbers are now produced at a rate of about one million tons per year, Egloff reported.

Propane and butanes . . . Propane and butanes produced from cracking are dehydrogenated to the corresponding olefins. Propane is also cracked to ethylene of which it is the major source.

Ethylene produced at a rate of about 1.7 billion pounds per year, Egloff advised, is the basic material for more chemicals than any other petroleum compound. The largest volume products are ethyl alcohol and ethylene oxide. Over one-half of the total ethyl alcohol production is now so derived. Ethylene oxide is the intermediate for ethylene glycol, acrylonitrile, ethanolamine, and many other products.

Ethylene glycol has many chemical uses, of which one of the most recent is in the new textile fiber Dacron. Acrylonitrile is the basis for the new fibers Orlon, Acrilan, and Dynel which, along with Dacron and Nylon, are revolutionizing the textile industry.

Egloff said polyethylene is of greatest interest among the newer ethylene products, now being used for unbreakable bottles, pipe lines, odorless and tasteless food containers, and films used to wrap foods for deep freeeze storage. In 1950 polyethylene accounted for less than 5 per cent of the total ethylene consumed, but by 1960 consumption of ethylene for this purpose alone should be over six times as great.

Benzene, toluene, and C₈'s . . . Many Platforming units, Egloff said, now are being constructed specifically for obtaining high yields of benzene, toluene, and C_8 aromatics, using naphthenic stocks.

The former sole source of these hydrocarbons was coal tar, which is dependent upon coke-oven operation, and present demands are far in excess of the quantities available from this source.

One of the principal problems in production of aromatics from petroleum was their separation from gasoline components. The Udex process was worked out to accomplish this by use of a glycol-water mixture. The separated aromatics are then fractionated to yield a chemical grade of benzene and toluene and a mixture of the C_8 hydrocarbons. The C_8 aromatics are then separated by fractional distillation and crystallization. The latter is an expensive procedure, but the value of products obtained warrants its use.

The largest volume use for benzene is in the preparation of styrene, which is required in large quantities for GR-S rubber and for polystyrene plastics. This type of plastics is used for a wide variety of applications, Egloff pointing out such examples as bottles for pharmaceuticals, shoe soles, rubber paints,

and wall tiles. Benzene is also a basic material for phenolic plastics and maleic alkyds. Nylon is another major consumer of benzene, for which demand is increasing rapidly. Many types of detergents require benzene. It is also basic for most of the pesticides such as DDT, BHC, and 2,4-D.

The C_8 aromatic fraction contains ortho-, meta-, and paraxylene and ethylbenzene. For a number of years, orthoxylene has been used as starting material for phthalic anhydride. The major use of phthalic anhydride is in alkyd plastics and in plasticizers. Egloff pointed out the **p**-xylene isomer has recently become important as one of the basic materials for the new textile fiber Dacron. This fiber shows great promise and demands will undoubtedly increase enormously. Furthermore, a new film called Mylar is produced from the same material used for Dacron. This film is particularly well suited for electrical insulation and will probably also be used for light-weight storm windows, collapsible tubing, and packaging.

Although **m**-xylene has not been used commercially except as a component of solvents, Egloff reported development work is being carried out on applications of the pure compound. Some results indicate that alkyd resins superior to those from phthalic anhydride can be produced from isophthalic acid, which is derived from **m**-xylene. It also shows promise as a a basic material for textile fibers.

Cushing Oil Festival Held

CUSHING, Okla.—A 3-day celebration commemorating 40 years of oil production in this area was held here last week.

Features of the celebration included a parade with Gov. Johnston Murray of Oklahoma and Tom Slick, Jr., of San Antonio, son of the discoverer of Cushing field, among the paraders; a 17-episode pageant of the history of Cushing; the crowning of a "Miss Petroleum of 1952"; and an open meeting of the Shawnee Oil Scouts Association.

GULF COAST

Vasen Sets Record

Five-inch liner is set at 20,337 ft. in deep wildcat

WIGGINS, Miss.—A liner has been cemented at 20,337 ft. in the world's deepest active test.

George Vasen 1 fee, 9-2s-11w, Stone County, Mississippi, has successfully run and set 5-in. liner from 13,511 to 20,337 ft. in a hole bottomed at 20,450 ft. in Jurassic rocks.

This marks the greatest depth to which pipe has been run and set. Prior record holder was Superior Oil Co. 1 unit in Wyoming's Green River basin which ran 7-in. casing to 19,765 ft. in a 20,521-ft. hole.

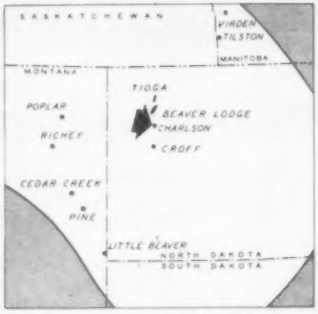
The liner in Vasen's well was cemented with 324 sacks of cement that had been treated to prevent premature setting. Temperatures in the neighborhood of 400° F. at the bottom of the hole would have prevented the use of ordinary oil well cement.

The bottom 360 ft. of liner was nickel plated. The lowermost 40 ft. of the long liner was preperforated to test the interval 20,297-20,337 ft. where shows of gas with high hydrogen sulfide content (possibly up to 45 per cent) were encountered while coring. The reservoir is reported to have a pressure of about 14,000 psi.

Vasen's well was diamond cored continuously from 14,450 ft. to total depth. The well was originally spudded in August 1946 and dug to 14,038 ft., where 7-in. casing was cemented to test what proved to be nonproductive sands at 13,220-13,868 ft.

RECORD SETTER is this well situated in a tung-tree grove in Mississippi. This photo was made before the hole reached its present near-record depth.

ROCKY MOUNTAIN



AMERADA'S NEW STRIKE in North Dakota is shown by arrow. Two years ago there wasn't a single field in the area shown. First discovery in the Williston basin was that at Virden at the upper right in Manitoba. At present there are 11 producing fields, and a twelfth potential discovery, in Saskatchewan, is now testing.

New Discovery

Amerada test finds oil in Fourth North Dakota area

WILLISTON, N. D.—North Dakota's fourth oil discovery was completed last week by Amerada Petroleum Corp.

The latest discovery apparently opened a new field in the Charlson area about midway between Croff and Beaver Lodge fields along the Nesson anticline.

The well was Amerada 1 North Dakota "D," located in C NE NW 16-153n-95w. It was completed in the Madison for an initial flow of 127 bbl. of oil and 131 bbl. of water through a ½-in. choke. Gas flow was 476 M.c.f. daily.

Beaver Lodge currently has 32 producing wells, with 30 more drilling. Tioga field has nine producers and seven drilling wells. In the Croff area there is one producing well and one drilling well.

SOUTHWEST

Levelland Properties Sold

MIDLAND.—Sapphire Petroleums, Ltd., has contracted to purchase 65 per cent of the Levelland field properties in West Texas from Stephens Petroleum Co., Oklahoma City.

Watkin Samuel, Sapphire president, said the properties comprise 784 acres of oil and gas leases on which there are now four producing wells.

Line Pipe Allocated

Crude, products, and gas lines to get 510,050 tons of steel in fourth quarter; some major lines to be finished

WASHINGTON.—A total of 205,669 tons of line pipe has been allocated by the Petroleum Administration for Defense for fourth-quarter construction of crude-oil and products pipe lines.

Another 304,381 tons of line pipe was allocated for natural-gas lines, making a total line-pipe allocation of 510,050 tons.

Thirteen large crude lines with an estimated total cost of $172,975 were given 97,471 tons of pipe, and 10 large products lines to cost $217,825,000 were given 79,948 tons. The remaining 28,250 tons was provided for all other small projects and MRO uses.

Four large projects were given allotments of pipe for the first time as follows:

West Coast Pipe Line Co.: 844 miles of 24-in. and 116 miles of 26-in. line from Wink, Tex., to Norwalk, Calif., to have an initial capacity of 200,000 bbl. of crude oil daily and to require 213,792 tons of pipe, was given 56,000 tons. The estimated cost of the line is $101,128,000 and completion date is the fourth quarter 1953.

United States Pipe Line Co.: 550 miles of 24-in. from Port Neches, Tex., to Jackson, Tenn., and 1,045 miles of 22-in. from Jackson to Newark, N. J., with 365 miles of branch and feeder lines, to have an initial capacity of 300,000 bbl. of products daily and require 319,500 tons of pipe, was granted 20,000 tons. The estimated cost of the system is $141,091,000 and completion is set for the fourth quarter 1953.

Texas Pipe Line Co. (Evangeline System): 196 miles of 16-in. products line from Port Arthur, Tex., to Baton Rouge, La., to have an initial capacity of 96,000 bbl. daily and completion date in the second quarter 1953, was allowed 28,451 tons, the total requirement. The estimated cost of the project is $12,900,000.

Sinclair Pipe Line Co. (Harbor Products): 90 miles of 16-in. products line from the Philadelphia area to New York Harbor, to have an initial capacity of 110,000 bbl. daily and to be completed in the first quarter 1953, was allotted 14,894 tons, the total requirement. Estimated cost of the project is $8,911,000.

Fourth-quarter allocations for other lines were as follows:

Crude lines . . . Shell Pipe Line Co.'s "Rancho," McCamey to Houston, Tex., 1,279 tons; Interstate Oil Pipe Line Co. expansion in South Louisiana (two projects), 2,250 and 6,526 tons; Pasotex Pipe Line Co., Wink to El Paso, Tex., 11,968 tons; Magnolia Pipe Line Co., expansion of service to Pegasus and Parks pools in Midland County, Tex., 978 tons; Service Pipe Line Co., line in Williams and Mountrail counties, North Dakota, 724 tons; Toronto Pipe Line Co., Sterling System, from Sterling and Logan counties, Colorado, to Gurley, Neb., 491 tons; Buckeye Pipe Line Co., loop between Sygnet, Ohio, and Samaria, Mich., 1,515 tons; Malco refineries, Inc., from Tocita field to Hospah field, New Mexico, 1,470 tons; Sun Pipe Line Co., line to connect new production in southwestern Fisher County, Texas, 622 tons; Interstate Pipe Line Co., revision of system from Texas border to Baton Rouge, 9,908 tons; Humble Pipe Line Co., from Hawkins field, Tex., to Texas-Louisiana boundary, 3,740 tons.

Products lines . . . Buckeye Pipe Line Co., Linden, N. J., to Rochester and Syracuse, N. Y., 1,041 tons; Phillips Petroleum Co., loops between Goldsmith and Borger, Tex., and line from Spraberry gasoline plant to Goldsmith 3,383 tons; Standard Oil Co. (Ind.), Sugar Creek, Mo., to Dubuque, Iowa, 2,000 tons; Phillips Petroleum Co., Plymouth-Benedum plant to Spraberry plant, 1,983 tons; Salt Lake Pipe Line Co., loops between Salt Lake City and Boise, Idaho, 3,390 tons; Bell Oil & Gas Co., Ardmore to Drumright, Okla., 3,550 tons; Indiana Farm Bureau Association, Inc., Mount Vernon to Peru, Ind., 1,256 tons.

Natural-gas lines . . . Of the 304,381-ton gas-line allocation, 136,814 tons was assigned to five major projects.

The five major projects, three of them scheduled for completion this year, will cost an estimated $281,023,710 and will have an aggregate deliverability of 1,067,000 M.c.f. of natural gas per day.

The line pipe not allocated to these projects, 167,67 tons, will go to more than 400 smaller projects, including gathering and distribution lines, other facilities, and maintenance, repair, and operations.

The major projects were listed by PAD as follows:

Wilcox Trend Gathering System: Capacity, 100,000 M.c.f. daily; estimated cost, $10,090,110; scheduled completion date, fourth quarter 1952; allotment, 20,952 tons.

El Paso Natural Gas Co.: Capacity, 200,000 M.c.f. daily; estimated cost, $51,720,000; completion date, fourth quarter 1952; allotment, 20,505 tons.

Tennessee Gas Transmission Co.: Capacity, 317,000 M.c.f. daily; estimated cost, $128,216,000; completion date, fourth quarter 1953; allotment, 42,854 tons.

Pacific Gas & Electric Co.: Capacity, 100,000 M.c.f. daily; cost, $13,322,000; completion date, fourth quarter 1952; allotment, 17,000 tons.

Southern Natural Gas Co.: Capacity, 350,000 M.c.f. daily; cost, $77,675,600; completion date, second quarter 1953; allotment, 35,503 tons.

Casing Price Up

OPS permits steelmakers to pass on increased costs

WASHINGTON.—Prices of oil-country tubular goods will be substantially increased as a result of action by the Office of Price Stabilization to permit fabricators to pass along increases in costs resulting from the increase of $5.20 per ton granted steel producers.

A "pass through" regulation (GOR 35) issued by OPS last week is designed to permit the price increase for steel to be passed through at subsequent stages of fabrication "without absorption and, of course, without pyramiding."

The regulation provides a specific dollars-and-cents schedule of the ceiling price increases to be permitted primary processors. Subsequent processors will calculate their adjustments on the basis of increases which their suppliers obtain and pass on to them.

Increases allowed . . . Under the schedule the ceiling price increases for oil-country tubular goods are as follows: Casing, F-25, H-40 and J-55, $6.50 per net ton; N-80 and deepwell casing, $9; tubing, N-40, F-25 and J-55, $11; drill pipe, grade D, $11; drive pipe, $6.50; miscellaneous tubular-couplings, $33.

Seamless lapweld and electric weld black line pipe, 2 to 4-in. plain end, $10.50 per net ton; 2 to 4-in. threaded and coupled, $11; 5-in. and over, plain

WATCHING WASHINGTON

Bertram F. Linz

Figures Don't Lie, But . . .

Government economists like to measure the prosperity of the country in terms of "gross national product" which represents the estimated value of all goods produced and services rendered.

Thus, gross national product during the first half of 1952 was at the rate of $340 billion a year, and this figure is put beside the 1939 gross national product of $91 billion to show how prosperous we are today.

Economists outside the Government, however, sometimes put a different slant on the figures. Instead of comparing 1952 with 1939, they compare 1939 with 1952 by translating the later figures into dollars with 1939 buying power.

When the 1952 GNP is put in terms of prewar dollars the purchasing power of this year's output shrinks to $180 billion. That is not quite double the 1939 figure, instead of being more than three times as great.

The increase in the national production is supposed to represent both the greater demand arising from increased population and the advance in living standards. But today's GNP doesn't faithfully reflect those factors because the Government has become such a big purchaser of goods and services. Whereas, in 1939, government purchases were only $13 billion, in the first quarter of this year they were at the rate of nearly $75 billion, and when you take the difference from the 1952 figure it indicates the average individual isn't much better off than he was 13 years ago.

Which probably isn't telling anybody anything.

Price Control and Politics

Observers in Washington are making mental bets that price controls will be junked before election day.

New Price Stabilizer Tighe Woods is making a cross-country tour to find out what housewives think about controls. He has said that if he finds they don't want them he will wipe them out.

But it's a good bet Woods will come back from his trip and report a universal demand for water-tight price regulation.

Then President Truman may declare the present law is not stiff enough because Congress refused to give him all the powers he requested. He then might junk the price program and place the blame for its failure on the Republicans.

That would make prices a major issue in the campaign and the Stevenson-Sparkman organization could go to town on it.

Barge Bugaboo

Barge construction is at a virtual standstill, due to lack of steel, with little indication of its resumption on any considerable scale through the remainder of this year.

Meeting with National Production Authority officials recently, some shipbuilders disclosed they have not put any new barges on the ways in the last 2 months.

Second and third quarter allotments accepted by the steel mills before the strike are expected to be filled by the end of the year. In the meantime the shipyards, where employment has fallen a third or more, are trying to keep going on repair jobs and construction of tow boats, which require less steel than barges.

Open the Door, Harry

An even more drastic lowering of the barriers to foreign trade than has occurred over the past 20 years has been recommended to President Truman as an aid to European recovery.

Ambassador William H. Draper, Jr., Truman's special representative in Europe, has recommended: Extension of the reciprocal trade agreements program, simplification of customs procedures, and the progressive lowering of other import restrictions and duties.

Draper complained the American people do not understand and accept the necessity for increased use of foreign products so that other countries can buy more raw materials here to make into things to sell us.

His concern was wholly over the prosperity of Europe. He did not speculate over what must happen here if a flood of foreign oil and commodities should overwhelm domestic producers and manufacturers.

end, $6; 5-in. and over threaded and coupled, $6.50.

Alloy steel: Tubing, N-80, $14 per net ton; drill pipe, grade E, $12.37; casing, N-80, $9; plates $10. High strength, low alloy plates, $6.

Increases allowed on direct mill shipments in less than carload lots and all shipments out of warehouse stock are 25 per cent for standard weight line pipe in sizes not exceeding 6 in., and 30 per cent for larger pipe and for all sizes of extra and double extra strong and large o.d. pipe.

Prime quality oil-country tubular products carry a 10.6 per cent increase for warehouse or field stock sales.

Strike Cost: 5,000 Wells

WASHINGTON.—The domestic oil industry will be able to drill only 45,000 wells this year, instead of the 50,000 programed, because of the recent steel strike.

The loss of the 5,000 wells will mean the loss of 113,000 bbl. daily of potential productive capacity, according to estimates of the Petroleum Administration for Defense.

Drilling operations, over-all, are not expected to reach prestrike levels until early next year.

The steel industry estimates its production loss, as a result of the 54-day strike, at 18,000,000 tons.

"Escalator" Gas Order Due

WASHINGTON.—An order prohibiting escalator clauses in contracts for the purchase of natural gas where they would pierce price ceilings is expected to be issued by the office of Price Stabilization early this week.

Reportedly, the ban would apply to all contracts regardless of when they were signed and would protect the price ceilings set by OPS for natural gas in the field.

A large number of applications for approval of contracts with escalator clauses are pending before the Federal Power Commission, which is expected to begin to pass on them next month.

There was no indication whether the commission might approve such contracts and then leave it to the companies to work the problem out with price officials, or refuse or defer action.

Product Exports Up

WASHINGTON.—Exports of major oil products averaged 194,300 bbl. daily for the week ended August 15 against a corrected average of 173,700 bbl. during the preceding week, ac-

cording to Petroleum Administration for Defense figures.

The higher average was due to increased shipments of kerosine and distillate which more than offset declines in exports of other products.

A belated return from District 5 increased the average of residual exports for the week ended August 8 to 56,100 bbl. daily from the 52,900 bbl. reported by PAD in its preliminary figures.

Daily average exports of principal products for the week ended August 15, compared with the preceding week, and 4-week averages are shown in the accompanying table, in thousands of barrels.

	Week ended		Average
	Aug. 15	Aug. 8	4 weeks
Aviation gasoline	31.3	52.5	44.4
Motor gasoline	5.9	10.3	12.8
Kerosine	33.9	13.5	25.4
Distillate	80.7	41.3	90.4
Residual	42.5	56.1	56.7
Total	194.3	173.7	229.7

New Suit May Be Filed

Government may widen civil actions against oil companies for alleged overcharges to include firms selling in Kuwait

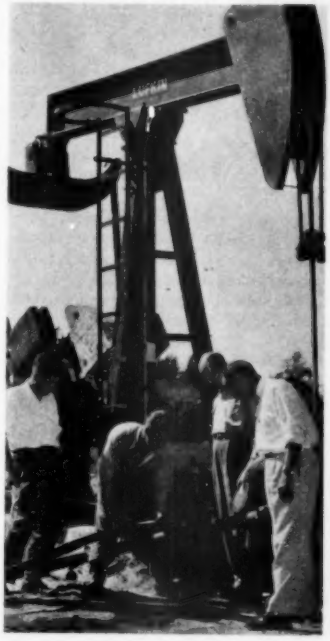
WASHINGTON. — The Mutual Security Agency last week turned over to the Department of Justice its records on ECA-financed purchases of oil from Kuwait. The agency will leave it to the department to determine whether the Government was overcharged by Gulf Oil Corp., Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.

The material was requested by the department with a view to deciding whether suits should be brought against the companies for recovery of alleged overcharges, along the line of the three suits filed in New York last month to recover more than $67,000,000 from Standard Oil Co. (N.J.), Standard Oil Co. of California, The Texas Co., and Socony-Vacuum, and their subsidiaries *(The Oil and Gas Journal, September 1, page 61)*.

MSA did not contend that it had been overcharged on Kuwait oil when it turned its claims against the other companies over to the department. Observers say, however, that the department was under considerable pressure to move against Gulf, the principal supplier of Kuwait oil.

Doubt is evident . . . That MSA was not convinced it had been overcharged by the three companies was indicated by the fact that it did not send a post-audit to the department but merely transmitted the documents relating to the sales and left it to the department to make an audit.

However, Acting Deputy Director C. Tyler Wood said in a letter to Asst. Atty. Gen. Holmes Baldridge, MSA's examination of the Middle East oil transactions "indicates that the prices charged on these shipments of Kuwait crude, when adjusted for gravity, have closely approximated those charged by the Arabian crude-oil suppliers," and, in view of the Government's suits against the Arabian suppliers, "the United States Government may have valid claims against the suppliers on account of these Kuwait shipments."



Back to the Well Head

Petrochemicals return to their point of origin in the form of Tenite butyrate plastic pipe, shown here being installed as a surface flow line between a pumping well and a tank-battery header in Alberta's Redwater field. The pipe is lightweight, tough, and resistant to paraffin plugging, which causes a lot of trouble in Redwater. Basic materials for the plastic pipe are produced from propane and natural gas.

The paid shipments from Saudi Arabia which were the basis for the three suits filed by the government amounted for the same period to $285,566,422.70.

Hearings Delayed

Deadline for submission of records now October 3

WASHINGTON.—The special grand-jury investigation of the oil industry will not get under way before October 3 at the earliest.

That is the deadline for the submission of documents called for under subpoenas served on 18 companies by the Department of Justice.

In the meantime, department and company attorneys will try to reach an agreement to limit the volume of material which the companies are to submit. The subpoenas called for all records since 1928, and six companies filed motions with the federal District Court to quash them on the ground that they were illegal and oppressive.

The grand jury was sworn in September 3. It met September 11 for the submission of a few documents but is expected to meet only briefly through the remainder of this month.

The motions to void the subpoenas were filed by Standard-Vacuum Oil Co., Standard Oil Co. (N. J.), Standard Oil Co. of California, Socony-Vacuum Oil Co., Inc., California-Texas Oil Co., Ltd., and Arabian American Oil Co The motions were scheduled to be heard September 10, but the court postponed the hearing until October 1 and ordered the companies and the department to attempt to reach an out-of-court agreement on how many documents should be made available.

Twelve other firms whose records were subpoenaed accepted an offer by the department to hold informal conferences and submit some of their records on a trial basis, with further conferences later if additional records are needed.

In their motions to quash, the companies pointed out that many of their records are abroad, and it would be a difficult task to secure and assemble them for submission in Washington.

Material for propaganda . . . They told the court, too, that the Government's attack on the oil industry would provide Russia with plenty of material for propaganda against the United States, particularly in the Middle East. In that area, the investigation also might be considered an unwarranted interference by this nation in the internal affairs of the oil-producing countries.

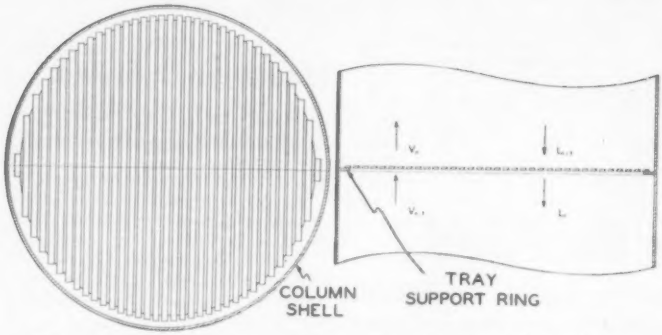


FIG. 1—Plan and elevation cross-section drawings of Shell's new Turbogrid trays.

Refining Development

Shell Development claims lower pressure drops and higher capacities for its new, simplified fractionation tray

Kenneth B. Barnes

LOOK—no bubble caps! That seems a pretty good way of describing the new fractionating plate just announced in New York by Shell Development Corp.

And when Shell says "no bubble caps," it isn't speaking about obsolete or specialized packed distillation towers that might be filled with metal helixes, carbon saddles, ceramic rings—or even brick-bats.

Shell calls its new development the "Turbogrid" tray. No bubble caps. No liquid downcomers.

Shell's new Turbogrid trays are ultra-simple in construction. They consist merely of a flat grating extending uniformly over the entire column cross-section. Openings in the grating are parallel slots of appropriate length, width, and number (see Fig. 1).

Both vapor and liquid flow uniformly through the slots in the tray. A holdup of liquid on the tray occurs, but for equivalent separation this holdup is considerably less than on bubble-cap trays. Total pressure drop is further lessened and vapor capacity is accordingly increased on the grid trays, since they do not contain the risers, reversals, and annular vapor passages of bubble caps, which add to friction loss and total pressure drop.

Shell undertook the development of its Turbogrid trays because it felt that in conventional trays the best cross-flow design is a compromise of tray structural features—of downcomer area with area for cap pattern, of uniform distribution and good tray efficiency with high pressure drop, and of downcomer height with theoretical plates per unit height of tower.

Test results . . . Shell has tested the performance of these trays in more than 20 plant installations.

The grid trays in some cases have given up to 100 per cent greater capacity than well-designed bubble cap trays, approximately the same separation efficiency per foot of tower height, and as much as 80 per cent less pressure drop per tray.

Shell reports the grid trays show the greatest capacity advantage in columns having high liquid loads—deethanizers, depropanizers, stabilizers, and absorbers, for example.

Shell believes the capacity advantages lead to savings up to 50 per cent in installed cost of new column shells; in replacement service, Turbogrids installed in existing towers cost about half as much as bubble cap trays.

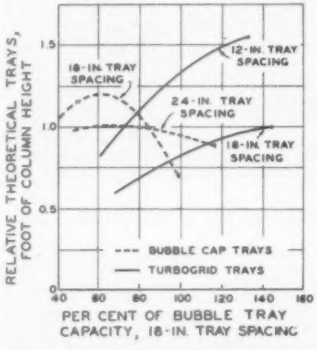


FIG. 2—Performance curves for Turbogrid and conventional bubble-cap trays in C_7 and C_8 hydrocarbon fractionation.

Capacity and efficiency . . . Relative theoretical trays per foot of column height obtained with typical Turbogrid trays at 12-in. or 18-in. tray spacing and with bubble cap trays at 18-in. or 24-in. spacing are shown in Fig. 2.

The curves are shown as functions of the per cent capacity of bubble-cap trays at 18-in. spacing; the dashes at the ends of the curves indicate load points. Data are for a C_7-C_8 hydrocarbon system at total and finite reflux conditions.

Typical installations of Shell's Turbogrid columns now in service include deethanizers, debutanizers, topping dephlegmator, depropanizers, C_7-C_8 fractionator, sour water stripper, isopropyl and sec-butyl alcohol acid strippers, chlorinated hydrocarbons fractionator, chlorohydrins strippers, methyl isobutyl ketone plant columns, various gas scrubbers and strippers (removal of acidics, CO_2, SO_2, etc.).

Industry Briefs

HOBBS, N. M.—A monument marking the discovery well of Hobbs pool in Lea County, New Mexico, will be unveiled October 11 in special Oil Appreciation Day ceremonies. The well, still producing, is Stanolind Oil & Gas Co. 1 State-A, 1 mile southwest of the Hobbs city limits. It was drilled by Midwest Refining Co., predecessor of Stanolind, and was completed June 13, 1928.

WASHINGTON.—Elmer E. Batzell, general counsel of the Petroleum Administration for Defense during the past 2 years, has resigned to return to private law practice in Washington. He has been succeeded by William Simon of Chicago.

WASHINGTON. — The Office of Defense Mobilization plans to exempt the petroleum industry from the application of Defense Manpower Policy No. 4, by September 20 if no definite opposition to the plan is expressed by then.

Coalinga Woes

Three wells just outside of unit vex unit operators by gathering in oil driven down structure by injected gas

D. H. Stormont

LOS ANGELES. — Shortcomings in California oil-conservation statutes are resulting in headaches for several oil companies engaged in a unitized pressure-maintenance project at Coalinga Nose in Fresno County.

Some of the crude driven downstructure by the gas-injection project is being withdrawn by three wells just outside the unit and well down on the south flank.

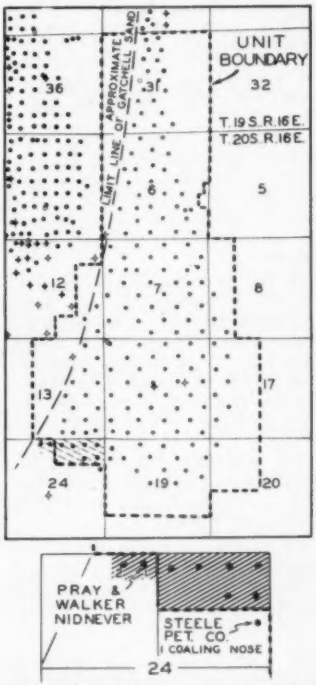
If wells in the unit are overproduced in an effort to counteract this migration, benefits of a program that is expected to result in the recovery of an additional 75,000,000 bbl. of oil will be to some extent nullified.

The wells which are causing the agitation among the unit members belong to Pray & Walker and Steele Petroleum Co. Spokesmen for the unit claim the amount of oil sand in these wells was insufficient to effect a payout. The wells, however, on gas-lift are producing about 1,300 bbl. of oil daily along with some 1,800 bbl. of water. Their gas-oil ratios are approximately 6,000 cu. ft. per barrel, as compared with an average unit ratio of 400 cu. ft. per barrel.

Steele Petroleum Co. 1 Coalinga Nose was completed on gas-lift last March, producing about 425 bbl. of water daily along with some oil. After being gas-lifted at high rates for about 60 days, the amount of oil production increased. The well was recompleted late in August following remedial work and on gas-lift flowed oil at the rate of 400 bbl. daily plus a 60 per cent water cut.

Pray & Walker 1 Nidnever originally was completed in November 1949 before the unit was placed in operation. On gas lift it flowed 80 bbl. of oil and 1,400 bbl. of water. This well has since been redrilled and 2 Nidnever completed. Their production recently was reported to be about 1,200 bbl. of water and 900 bbl. of oil daily.

Not the first trouble . . . The Coalinga Nose Unit was formed through unitization of the properties of Standard Oil Co. of California, Superior Oil Co., The Texas Co., Honolulu Oil Corp., Seaboard Oil Co., McAlester California Oil Co., and Los Nietos Co. The latter, a wholly owned subsidiary of Union Oil Co. of California, was named operator.



COALINGA NOSE unit area is shown in top sketch. Part of Section 24, below, represents lightly shaded area in lower left of unit drawing and shows locations of "problem" wells.

Gas injection was started in April 1950 at the rate of about 17,000 M.c.f. daily. In December of that year pressure-maintenance operations had to be suspended because oil was being driven downstructure and produced by six wells of Universal Consolidated Oil Co. These wells, in N½ NE Section 24, were being produced at a rate of about 700 bbl. daily, or about 500 bbl. per well more than the recommended MER.

Unable otherwise to proceed with the pressure-maintenance program, the participating companies purchased the 80-acre tract. The price was high—about $500,000 for certain lease equipment plus 10,000,000 bbl. of crude delivered over a 10-year period. At the current price received for this crude, the sale amounted to approximately $26,000,000.

Courses of action . . . Unit members may meet this latest problems by taking one of three possible steps: They can:

. . . Buy the property. Participants in the unit have negotiated with Steele and Pray & Walker for the purchase of their wells. However, there reportedly was a wide margin between the offered and asked prices.

. . . Overproduce certain of their wells and thus negate the low-pressure areas created outside the unit. Because of the effects such action would have on the effectiveness of the entire project, the seven-company group apparently does not want to take this step.

. . . Take legal action. Since the outside wells are being produced with high gas-oil ratios, the group thinks that legal action can be taken to minimize the drainage. As they see it, sections of California's amended conservation statutes could be construed that unreasonable waste of gas (Section 8b) is taking place. More specifically, Section 8d states that (following a hearing):

"If it shall appear that gas is being produced from any oil well or wells in quantities exceeding a reasonable proportion to the amount of oil produced from the same well or wells, even though it is shown that such excess gas is being used in the generation of light, heat, power, or other industrial purposes . . . the state oil and gas supervisor shall hold that such excess production of gas is unreasonable waste thereof. . . . If the waste of gas be found unreasonable an order shall be made directing that such unreasonable waste of gas shall be discontinued or refrained from to the extent stated in said order."

Supply-Demand Gap

California output in first 6 months falls below needs

LOS ANGELES. — Supply and demand data by the Bureau of Mines indicate that production of crude and natural-gas liquids in California in the first 6 months of the year fell short of meeting civilian, export, and military demands by about 41,000 bbl. daily.

Total demand amounted to 1,104,000 bbl. daily, compared with total production of 1,063,000 bbl. daily. Receipts from outside District 5 averaged 61,000 bbl. daily.

A decrease of 44,700 bbl. daily in military liftings for the first half of the year resulted in an over-all drop of 6,000 bbl. daily in total demand for

District 5. The net increase in civilian and export demand was about 39,000 bbl. daily or a little less than 4 per cent.

The decrease in military liftings from District 5 shows that production in the district can not supply the larger quantities needed to meet increases in civilian demand and at the same time provide more than 100,000 bbl. daily for military use.

Since production of crude and natural-gas liquids in District 5 increased only 18,000 bbl. daily, the gain covered less than half of the increase in civilian and export demand for 39,000 bbl. daily. This difference was met by larger receipts from outside the district.

Compared with last year, production was up 18,000 bbl. daily and receipts from outside the district increased 28,000 bbl. daily. These larger supplies, combined with the decrease of 6,000 bbl. daily in total demand, represents a gain of 52,000 bbl. daily in availability of liquids for rebuilding inventories.

Suit Filed Over Island

LONG BEACH.—The city of Seal Beach has filed complaints against Monterey Oil Co. and Healy-Tibbitts Contracting Co. charging the two concerns with violating the city's ordinances against drilling in city limits and for not obtaining a building permit.

The action results from Monterey's construction activities 1½ miles offshore, where it is building a $1,000,000 island from which to drill three exploratory wells. Healy-Tibbitts is building the 75-ft. diameter structure. Seal Beach in effect is claiming that the city limits extend that far; that even though Monterey secured the sanctions of the state of California, Department of Interior, U. S. Army, and Department of Justice, it also should have consulted the city of Seal Beach.

Pilot-Plant Bids Asked

LONG BEACH, Calif.—Bids for the construction of a 6,000-M.c.f. pilot-scale compressor plant were being asked last week by Long Beach Oil Development Co., which will operate the plant for the Long Beach Harbor Department.

The compressor plant, expected to cost about $400,000, will consist mainly of three 550-hp. units for compressing gas to be used in an experimental gas injection-storage project. If tests prove the project feasible, it is planned to expand facilities so that 20,000 M.c.f. can be returned daily.

Plans for the pilot plant were drawn by J. B. Gill Co. It is contemplated the plant will be completed about March 1, 1953.

MEETINGS

Golden Anniversary

N.P.A., industry's oldest such association, observes its fiftieth birthday; boasts 15 of its 19 founding companies

George Weber

ATLANTIC CITY.—A half century of oil progress was celebrated here last week as the National Petroleum Association held its fiftieth annual meeting.

The industry's oldest organization of its kind, now numbering 43 oil companies and 27 associate company members, first met in June 1902 in Pittsburgh to secure good "to the the independent oil refiners of Pennsylvania and Ohio."

Of the 19 founding companies, 15 are still in business and are active association members. A feature of this meeting was a review of the association's history from the days of the first president, H. A. Jamieson, of Warren Refining Co., to the current president, Earle M. Craig, of Freedom-Valvoline Oil Co.

The remainder of the meeting was concerned with things to come. Highlight was a symposium on "Jet Fuels—Present and Future."

Six experts on engine design, fuel requirements and availability joined in projecting the types and quantities of this new fuel which will be in demand in the foreseeable future.

Steel strike discussed . . . The recent steel strike was discussed by Thomas F. Patton, vice president and general counsel of Republic Steel Corp.

He expressed his firm conviction that if the union and the companies had been permitted to carry on negotiations without government interference, much of the huge loss brought about by the strike would have been avoided.

A premier showing of the motion picture "Crossroads, U.S.A." featured one of the general sessions. This film is sponsored by the oil industry information committee.

At a meeting of the lubrication committee of the A.P.I. Division of Marketing it was reported that over 50,000 copies of the new booklet on service classifications for motor oil had been ordered.

The committee noted, without action, a request from a major automotive company that a 5W motor oil be manufactured for winter use in northern latitudes, such a grade to conform to the viscosity of 10W at high engine temperatures. Progress was reported in the standardization of cans, pails, and drums for oils and greases.

Charges criticized . . . In his address before the meeting, N.P.A. president Earle M. Craig lashed out against the Government's cartel charges.

These are not a matter of cheer for small businesses said he, but rather a cause for fear that a similar attack may be made upon us. "The most recent example of federal government intrusion in the oil industry has occurred in the last month when with great fanfare some of the larger oil companies were accused of being members of an international conspiracy to dominate world oil trade.

"That is apparently part of a shrewd propaganda technique that this attack is being made for the benefit of small business. However, we of the smaller companies of the industry are not cheered by this act of government because we recognize that an unjust attack on one company or a group of companies does not help us, but gives us cause for fear that a similar attack may be made upon us."

Officers named . . . At a meeting of the board of trustees, the following officers were elected for the coming year: President, A. W. Scott, Wolf's Head Oil Refining Co., Inc., Oil City, Pa.; first vice president, Fred G. Bannerot, Jr., Elk Refining Co., Charleston, W. Va.; second vice president, Paul R. Beck, Pennsylvania Refining Co., Butler, Pa.

Heating Seminar Scheduled

TULSA.—The third annual John Zink Process Heating Seminar will be held October 4 at the John Zink plant in Tulsa.

More than 400 engineers are expected to attend the 1952 meeting, which is designed to provide practical material as aids in improving plant operation.

Papers to be presented will cover tube failures in process heaters, design and maintenance of fractionating towers, "blistering" of catalytic process vessels, and alloy castings for heat and corrosion resistance.

Ideal Reservoir

Redwater field cited as excellent example of reservoir engineering and conservation; close cooperation credited

Henry D. Ralph

CALGARY, Alta. — Redwater field, Devonian reef field, just north of Edmonton, is an example of almost ideal reservoir engineering and conservation practices, in the opinion of a group of Alberta operators and provincial officials who took part in a panel discussion during the Interstate Oil Compact Commission meeting at Banff.

Redwater was selected for a case study because of the application there of conservation practices developed in the United States and of the close cooperation between operators and regulatory officials. Since the more important oil finds in Alberta have been in Devonian reefs, it is probable that other fields will have a similar reservoir performance and production history.

Discovered exactly 4 years ago, Redwater is now fully developed with 915 producing wells on a 40-acre spacing pattern, operated by 21 companies.

The reef lies at a depth of about 3,100 ft., has an average pay thickness of 95 ft., and covers 37,966 acres. Recoverable oil in place was estimated at 744,000,000 bbl., and cumulative production to date is about 49,000,000 bbl.

Because of the excellent permeability many wells were initially capable of producing 1,000 to 2,000 bbl. per day, but because of the low original reservoir pressure of 1,050 psi., and the low allowables caused by lack of market demand all wells are now on pump.

Pressure data . . . The field has a natural bottom water drive from a large aquifer which is sustaining bottom-hole pressure at a uniform rate of decline.

For each million barrels of oil produced to date there has been a pressure drop of 5.7 psi., which indicates approximately 95 per cent replacement by water expansion.

At the current average rate of production of about 80,000 bbl. per day the reservoir pressure will have declined to the bubble point of 485 psi. by the early part of 1955, at which time some artificial pressure-maintenance project will be necessary to keep the gas from coming out of solution.

The conservation board requires the metering of all gas produced with oil, monthly bottom-hole pressure tests, and has made several electric analyzer studies to check on reservoir performance.

To date the bottom-hole pressure has declined an average of 226 psi. from the original pressure, though there is a pressure differential of about 100 psi. between northern and southern ends of the field. Pressure usually rises during the winter when allowables are sharply curtailed.

Only 127 wells have produced salt water, with a total cumulative production of 795,000 bbl. of water. Recently a disposal company was organized to inject the salt water back into the formation.

Studies are now under way by the Redwater pool committee, representing all the operators, with a view to instituting some sort of pressure maintenance. Within a few years it is anticipated that the natural water drive will support a production of only about 30,000 or 35,000 bbl. per day, or about 25 per cent of the present MER.

Operating plans . . . The Redwater pool committee was organized about 6 months after the field was discovered, and soon set up an engineering subcommittee. It has worked closely with the conservation board in developing the operating plan for the pool.

During the first 6 months after discovery the maximum rate of production was set at 650 bbl. per day per well, but production never reached that figure due to marketing difficulties.

The rate was successively reduced until September 1950 when the board developed its MPR formula (Maximum Permissive Rate) of 165 bbl. per day. As the field approached full development at the end of 1951 this was cut to 130 bbl., but more recently recognition of the excellent water drive has permitted this to increase to 145 bbl. per day per well.

In June 1952 the board and the pool committee agreed on an MER of 135,000 bbl. per day for Redwater pool. On the basis of 915 wells this is an average of 147.5 bbl. per well.

Since the board began market proration of Redwater production in December 1950, production has varied from the economic floor of 37 bbl. per day per well to a maximum of 112 bbl. This wide swing is due chiefly to the seasonal effects of shipping on the Great Lakes at the terminus of the Interprovincial Pipe Line.

Board officials declared that the successful operation of Redwater pool was due to the fact that the reservoir behaves almost in a textbook manner and also because there are experienced but relatively few operators in the field, all of whom cooperated in engineering studies and in furnishing unusually complete geological and engineering data.

Gasoline Plant Planned

EDMONTON, Alta.—A second gas-absorption plant is to be built to serve the oil fields surrounding Edmonton, it has been announced here.

Leduc Southern Absorption, Ltd., will build a $2,000,000 absorption plant adjacent to the McLeod-Kavanagh sector of Leduc field. The plant will be located 5 miles west of the town Leduc, which is 20 miles south of Edmonton.

Imperial Oil, Ltd., already operates a larger absorption plant at the oil town of Devon.

The new plant will have a daily capacity of 15,000,000 cu. ft. of natural gas and will produce propane, butane, and natural gasoline as well as natural gas for industrial and domestic use.

The construction contract has been awarded Blaw-Knox Construction Co.

Rank Wildcat Spudded

EDMONTON, Alta. — Twenty-six oil companies have joined in an oil venture in some of the Canadian Rockies' most rugged terrain.

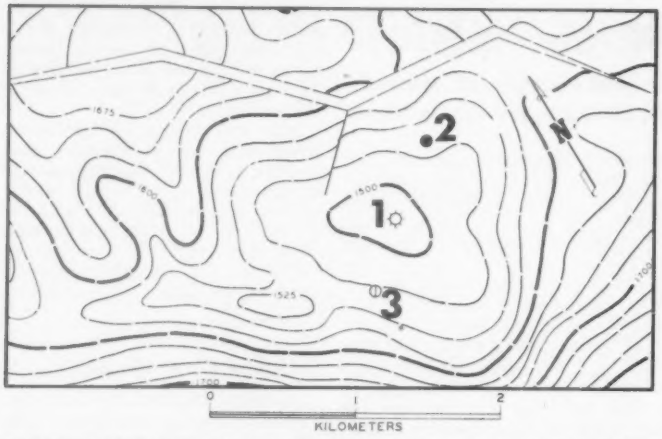
The well, Wilrich-Trans Era-Central-Del Rio-Stoney Lake No. 1 was spudded in September 1 at Lone Mountain in the Monkman Pass. This pass leads through the Rockies from the Peace River district of northern Alberta and northern British Columbia.

Double "A" Drilling, of Edmonton, has the contract.

Alberta Reservations Let

CALGARY, Alta.—More than 59,000 acres of petroleum and natural-gas reservations were issued recently by the Alberta government.

The largest spread was a 39,040-acre block in the northern foothills area about 60 miles north of Jasper. It went to G. D. Love.



STRUCTURE MAP showing location of first three drilling projects in Ezequiel Ordonez field. Figures are in meters.

Biggest Pemex Strike?

Authorities on Mexican oil think the Ordonez discovery may be the most significant since government took over

Dahl M. Duff

GEOLOGISTS familiar with Mexican oil developments believe that the new Ezequiel Ordonez field ranks as one of the most significant oil discoveries in that country since Petroleos Mexicanos took control of the industry in 1938.

The No. 2 well was brought in on this structure a few weeks ago. It tested 6,200 bbl. daily on a 11/64-in. choke. Since then, the No. 3 well has been drilled on the southwestern flank, and unofficial reports are that on August 30, it showed for between 5,000 and 6,000 bbl. daily on a small-size choke.

The Ezequiel Ordonez discovery opens up the possibility of production along a trend running northwest from the new field. Successful wells on these structures, together with the Ezequiel Ordonez discovery, would provide major additions to Mexican crude-oil reserves.

The Ezequiel Ordonez area, which is of considerable importance in its own right, is located about 13 miles east of the most easterly installations in the Poza Rica field. Sen. Antonio J. Bermudez, Pemex director-general, gave credit for the discovery to three Pemex officials: Manuel Rodriquez Aguilar, exploration director; Alfonso Barnetche, production manager; and Santos Figueroa Huerta, who directed the geophysical work.

Prelude to discovery . . . The exploratory search for the trend on which the Golden Lane is located has been under way since 1948 with gravimeter and seismograph, and even prior to 1948, the Acontitla and Horcon wildcats gave valuable stratigraphic information. About 60 miles southeast of the last field considered a producer in the Golden Lane, on the first of the several structural highs defined in this direction, Miguel Aleman 1, originally Arroyo Grande 1, in 1949 found the El Abra limestone (Cretaceous) at 6,717 ft. subsea. Permeability of the limestone was high, though it was found invaded by salt water and with traces of heavy hydrocarbons. A velocity survey on this well resulted in reinterpretation of the seismograph data and additional detail work that culminated in the location of Arroyo Grande 2. This well, drilled early in 1951, reached the top of the El Abra at 5,317 ft. subsea.

The next exploratory effort, after further seismograph work, was Poza Verde 1, drilled early this year on the same trend but on a location considered structurally more favorable. Results in the Poza Verde well were similar. The limestone found at 4,972 ft. was entirely encroached upon by water with very slight traces of hydrocarbons.

The discovery . . . The first Ezequiel Ordonez well was originally known as Tenixtepec 1, but was renamed in honor of the memory of a well-known Mexican geologist. This well was completed last June with the El Abra reached at 4,792 ft. subsea. The stratigraphic column, identical to that of the wells drilled earlier, was as follows (all depths subsea):

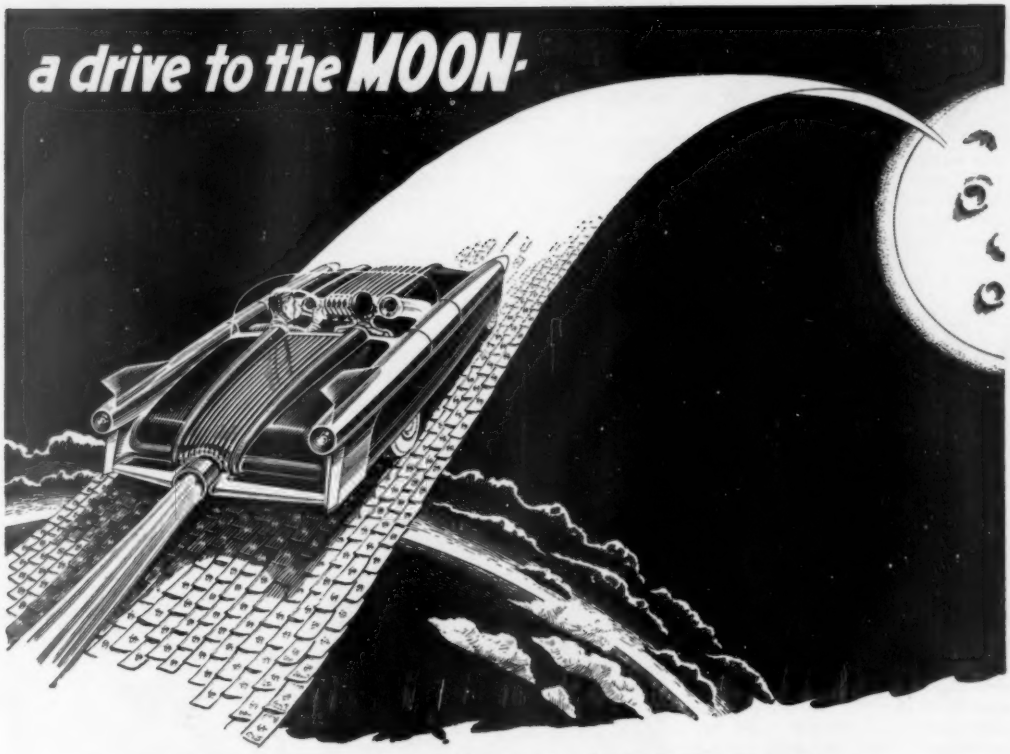
Upper Palma Real, 2,726 ft.; lower Palma Real, 3,546 ft.; medium Chicontepec, 4,494 ft.; lower Chicontepec, 4,500 ft.; and El Abra, 4,592 ft. The geologic age of the strata correspond to the Oligocene down to the lower Palma Real, to the Eocene down to the top of the El Abra, and to the Cretaceous below the El Abra.

On a drill-stem test in the No. 1 well, gas came to the surface. At 4,838 ft., 6⅝-in. casing was cemented, and the well completed in open hole with 2⅞-in. tubing. With 11/64-in. choke, the well tested 12,800,000 cu. ft. of gas daily with surface pressures of 1,945 psi. in the tubing and 2,158 psi. in the casing. These results indicated that the well, located on the highest point on the structure, was in the gas cap.

The second well . . . Ezequiel Ordonez 2 was located 1,640 ft. northeast of No. 1 and from 82 to 98 ft. lower structurally. The stratigraphic column was identical with that of the No. 1 well. The top of the El Abra was 4,694 ft., or 102 ft. lower. On a drill-stem test in the limestone, gas flowed under identical bottom-hole pressures.

After 6⅝-in. casing was cemented at 5,097 ft., the 5⅝-in. hole was taken to the final depth of 5,236 ft. The limestone was found oil-impregnated from 5,166 ft. After running electric logs, a 4½-in. liner was cemented from 5,028 to 5,233 ft. and a squeeze job performed until cement-injection pressure of 2,982 psi. was attained. The liner was perforated between 5,210 and 5,230 ft. with thirty-six ½-in. perforations. After running 2⅞-in. tubing and treating with 500 to 1,000 gal. of acid, a production test yielded 6,200 bbl. of oil daily through a 11/64-in. choke.

Bottom-hole pressures under shut-in and flowing conditions as well as the bottom-hole pressure increase were taken, and it was found that the shut-in pressure was 2,366 psi. With the well



On a road paved with YOUR Dollars

A road twenty feet wide, carpeted with one dollar bills, extending 256,471 miles through space to the moon,--illustrates the astronomical magnitude of our Federal debt.

1932 was a bad year for most of us, whether we were in business, or looking for a job, or going to school.

1952 seems much better to the majority of our citizens, with increased business, high wages and a good education for the children.

But how much better off, really, are those of us who think "we're in clover"? Consider our National debt which has skyrocketed from 19 billion dollars to over 260 billion dollars in the past twenty years.

Such a figure is difficult to grasp. But it represents your debt, the amount that you and your family must pay. This debt is the obligation of every man, woman and child in the United States. The interest on this debt must be paid through taxes, and as the debt increases, the more our taxes will increase. If you have a wife and two children, your share of the Federal debt is now approximately $7,000.

Your debt is now 13 times what it was in 1932, and they're planning right now, down in Washington, to inflate it even more.

Do you like it? Is that what you want? If you don't like it and don't want further expansion of our Federal debt, it's up to you to let Washington know. Only when American citizens are aroused and speak up, by electing able and patriotic men to public office, will there be an end to this orgy of public extravagance.

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open and flowing through a ¾-in. choke, bottom-hole pressure was 2,340 psi. with a production of 4,200 bbl. daily, and surface pressures of 589 psi. on the tubing and 710 psi. on the casing.

The time elapsed to restore bottom-hole pressure under shut-in conditions was 3 minutes; gas-oil ratio under the flowing conditions was 50:1. This indicated that the reservoir conditions in the structure are identical to those in the Golden Lane fields, and that the reservoir energy is hydraulic.

The third well . . . The No. 3 well was started on the opposite, or southwestern flank, at a location 1,115 ft. away from No. 1. The El Abra was reached at 4,605 ft. subsea, or 13 ft. lower than No. 1, and the stratigraphic column was similar.

Since there were no mechanical difficulties drilling the cavernous and permeable El Abra limestone in No. 2, it was decided to take the No. 3 to the water-oil contact. Drilling was continued on 8⅝-in. hole to the 5,117-ft. level, which is equivalent on a subsea-level basis to that reached in the Poza Verde 1, found to be invaded by salt water. With 6⅝-in. casing cemented at 5,097 ft., temperature and radioactivity logs showed a variation in permeability from 4,979 ft. with the limestone occurring in alternate strata, permeable and dense. The well was jet-perforated from 5,061 to 5,068 ft. for a production test at this depth.

Rigs coming in . . . Pemex is now moving available rigs into this promising new area, both to test other structures along the trend and to develop the new Ezequiel Ordonez area. Work has already been started on a temporary 10-in., 15.6-mile pipe line to move the Ezequiel Ordonez crude into the Poza Rica system.

Pemex officials believe there is a good possibility other production will be found along the trend to the northwest of the new field. In the Horcon area, which is considered to be a continuation of the Golden Lane, No. 103 reached the El Abra limestone (of the same characteristics as at Golden Lane and Ezequiel Ordonez) at 2,808 ft. The well was completed with an initial production of 430 bbl. daily. The Horcon structure is about 50 miles from Ezequiel Ordonez and at a much higher altitude.

Pemex Pushes Work on Line

Construction of the Salamanca-Guadalajara products line in Mexico is moving ahead toward an anticipated December 1 completion date.

The line will move products from the 30,000-bbl. daily Salamanca refinery of Petroleos Mexicanos to several centers of population to the west and north of the plant. The recent delivery of approximately 20,000 tons of line pipe allowed work to continue, and the scheduled completion time is based on no further holdups in pipe shipments. Ditching for the line has been finished.

The system includes 82 miles of 8⅝ in. from Salamanca to Lagos and 122 miles of 6⅝-in. from Lagos to Guadalajara. There is a 53-mile branch of 6⅝-in. from Lagos to Aguas Calientes. Also included is 71 miles of 4½-in. from Salamanca to Morelia.

MIDDLE EAST

CONFERRING IN TEHERAN are W. Alton Jones, left, president of Cities Service Co., and Iranian Prime Minister Mossadegh. Details of Jones' visit still have not been announced. (Associated Press photo.)

Iran Believed Stalling

Mossadegh government still withholding official rejection of latest offer; British, U.S. ask for careful examination

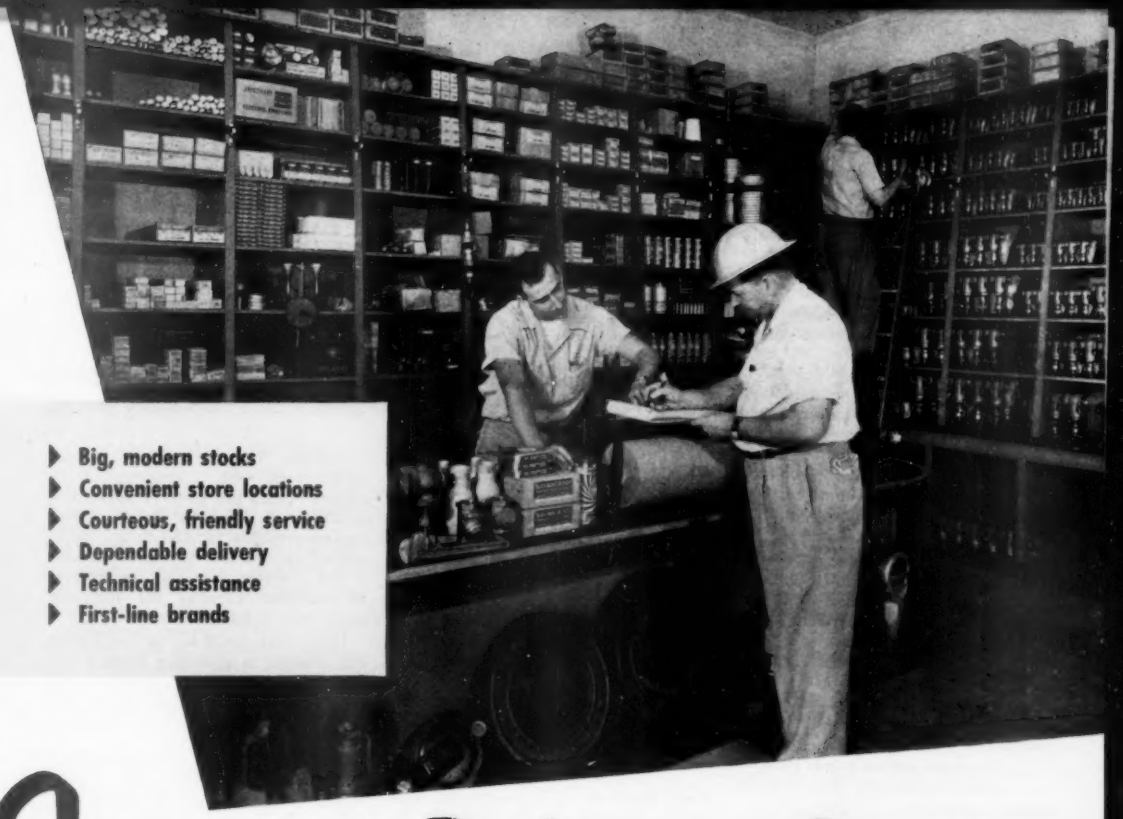
THE Iranian Government, though continuing to denounce the latest British-American proposals for settling the oil dispute, still failed last week to transmit a final and official rejection.

Some observers were guessing that Prime Minister Mossadegh was stalling in hopes that still better terms might be forthcoming. He called the solution outlined in the joint Truman-Churchill note as "not only inequitable but more severe and impracticable than earlier proposals."

The German financial expert, Dr. Hjalmar Schacht, arrived in Teheran from Germany for a study of Iran's economic crisis at Dr. Mossadegh's invitation. Rumors circulated in the Iranian capital that, if the oil issue is not settled in 2 weeks, the Iranian Government would start building up a system of government finance independent of oil income.

A series of public appeals to Iran to consider the new offer carefully was made by top officials in Britain and the United States. Anthony Eden, British foreign secretary, said in England that he hoped "there may still be time for wiser councils to prevail, in the interests of Iran as much as in our own." Other statements asking Iran to listen to reason were made by Prime Minister Churchill, Secretary of State Acheson, and U. S. Mutual Security Administrator Averill Harriman.

Court avoided . . . It was clear that Prime Minister Mossadegh's Government was not willing to submit the full question of compensation to the World Court at The Hague. He said he want-



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ed the specific points of the compensation question clearly defined in advance.

One possibility which the Iranians recognize is that the World Court might hold that Anglo-Iranian Oil Co., Ltd., is entitled to be paid for the loss of its concession rights from the time of nationalization to 1993. Dr. Mossadegh said Iran would never agree to the validity of the 1933 agreement under which the company's concession term was extended to 1993.

Counter claims . . . Iran has raised immense counter-claims against Anglo-Iranian, and Dr. Mossadegh declared that these must be considered first in any submission of the compensation issue to the court. Counterclaims on which Mossadegh said Iran would attempt to collect include:

. . . **"Payment** of the former company's debts to the Iranian Government for several years past as well as indemnity for delays in payment.

. . . **"Damages** caused by the prevention of the sale of Iranian oil through the intimidation and intrigues of the former company; aided by the British Government, forcing the Iranian Government into difficulties.

. . . **"Customs and monopoly rights** of the Iranian Government due from the former company.

. . . **"Taxes on petroleum products** consumed by the Allied forces in Iran."

Besides the proposed method of settling the compensation question, the Iranian prime minister also took violent objection to the clause in the American-British proposal providing that Iran and Anglo-Iranian would negotiate arrangements to resume the flow of Iranian oil to world markets. Dr. Mossadegh read into this suggestion the possibility of foreign interference in the technical and managerial side of the industry. This, he said, would never be accepted.

Jones leaves . . . Meanwhile, W. Alton Jones, president of Cities Service Co., ended his tour of Iran and left the country for a tour of the oil operations in Kuwait. A semiofficial Teheran newspaper said Jones had given the prime minister a report on the money, time, and personnel needed to resume operations at Abadan and in the fields. It also said Jones had offered his assistance to Iran.

Jones' activities in Iran gave rise to fresh reports that Cities Service may buy substantial quantities of Iranian oil. Two Denver men, Gerald Waldron, a food broker, and Richard S. Nelson, an importer, signed a contract last summer to sell Iranian oil in the United States, and it was said that Cities Service may be the buyer. Ray Carter, New York oil and tanker broker, was reported involved in the shipping phase of the deal. In New York, Cities Service said that, with Jones in Teheran, it could not comment on the reports. Carter's office confirmed that he was in Teheran but had no comment.

Richard Stokes, Lord Privy Seal in the former British Labor Government, who was sent to Teheran last year to attempt to negotiate a settlement, in a public statement in London said that private businessmen would have a better chance of ending the dispute than diplomats.

Hodgepodge Units

Aramco engineers building topping unit, other facilities at Ras Tanura plant from old parts drawn from many places

ARABIAN AMERICAN OIL CO. engineers are improvising with equipment already in the field to carry out modification of the company's Ras Tanura refinery on the Persian Gulf.

The work includes construction of a field-designed and fabricated crude-topping unit. By next spring the refinery is expected to be running more than 200,000 bbl. daily.

The Ras Tanura refinery was completed during the war with a capacity of 50,000 bbl. daily. Since then modifications and changes without the addition of major new units have enabled the company to triple this figure.

Parts scattered . . . Equipment from the stabilization unit at Dhahran, the gas-oil separators at Abqaiq, and the company's reclamation yards will be used for the topping unit. Some pumps, instruments, and heat exchangers are being ordered in the United States, but for the most part, the unit will be made up of parts from the company's three operating districts. The unit is expected to go on stream early next year, months earlier than would be the case if the equipment were designed, ordered and fabricated in the United States.

As now planned, one of the atmospheric columns will be constructed from two columns now at the Dhahran stabilizer. These towers will be welded top-to-bottom into one 75-ft. column. The second column is from the old Ras Tanura refinery, which has been idle since the present plant was completed in 1945.

One of the two strippers on the atmospheric columns will come from the old refinery. The other stripper is an old reformer column, also from the old refinery. The converted reformer column will be divided into two sections for kerosine and diesel stripping.

The naphtha rerun column in the topping unit will be adapted from a rectifying column currently being used as an air receiver at the Dhahran stabilizer.

Heater problem . . . Heaters also were a problem. The unit requires two furnaces, each with a capacity of 21 million B.t.u.'s per hour. Heaters now available at Aramco's Buqqa gas-oil separator station in Abqaiq are being moved to Ain Dar separator stations 1 and 3 where they will free heaters of sufficient capacity for the new crude unit at Ras Tanura.

Other work under way at Ras Tanura this summer is providing about 6,500 bbl. daily of additional capacity in advance of the construction of the new topping unit.

Second improvement . . . The second improvement currently under way involves the addition of a heater and heat exchangers to the reformer fuel-oil stripper. The heater is being obtained from Bahrein Petroleum Co., Ltd., and the exchangers are being fabricated in the field.

In addition to these additions and changes, Aramco expects to place a new catalytic polymerization unit in operation at Ras Tanura sometime next spring. The unit has a capacity of 1,100 bbl. daily and will add high-octane gasoline to the refinery's production.

World Briefs

Standard-Vacuum Oil Co. has enlarged plans for its Durban, South Africa, refinery to include asphalt facilities. About 25,000 long tons of asphalt annually will be produced by the plant. This will meet some 20 per cent of the estimated requirements of the Union of South Africa in 1954.

Crude-oil production in Mexico this year will exceed 80,000,000 bbl., equivalent to an average of about 219,000 bbl. daily, an official of Petroleos Mexicanos predicted recently in Mexico City. The estimate compares with 78,780,387 bbl. last year, or about 216,000 bbl. daily.

"Cartel" Charges Hit

British worry that furor may have ill effect on foreign operations, deplore innuendo in FTC report on world oil

SOME pointedly critical comments are being made in London over the Federal Trade Commission's oil "cartel" report and the U. S. Justice Department's investigation of the international oil companies.

The British stake in the international petroleum industry is almost as large as that of the American companies, and there is some concern over the possible outcome of the present furor.

Furthermore, unofficial British circles are raising the question of the jurisdiction of American courts over completely foreign activities.

Apparently recognizing the somewhat different view of business concentration in Britain, the influential London Times recently commented: "The term 'cartel' is in itself a grave charge in American law. . . . The companies concerned might reasonably complain, therefore, that if they are to face criminal proceedings, even at the grand-jury stage, they might be spared the official label of 'cartel' in advance.

Innuendoes deplored . . . "Many of the matters charged in the report are widely known facts, which no one would dispute. It is true that several companies jointly own Iraq Petroleum Co. which holds the oil concessions for most of Iraq. It is also a fact that some men are on boards of several 'interlocking' companies in the Middle East and elsewhere. What is to be deplored is the manner in which innuendoes are attached to facts which might be inoffensive. . . . "

"In many other countries, the further question would be asked whether the coordination that does exist between the oil companies, whatever its degree, is good or bad in effect, and whether it is lawful in countries in which it takes place. The practices that are alleged concern, essentially, the action of companies outside the United States."

Serious consequencies . . . The Times said it is not difficult to imagine the state of affairs that might arise in many countries in the world if the complex system of contracts, concessions, and obligations entered into by the world oil industry were suddenly denounced by an American court. "Unrestrained competition between foreign oil companies in a relatively undeveloped society was practiced in Mexico before the expropriation. If its advantages are judged by the final outcome, would anyone seriously propose it nowadays for Iraq?"

In connection with the cartel charges, it has been pointed out that last month in a British court, British Nylon Spinners obtained an interim injunction to restrain its part-owner, Imperial Chemical Industries, from obeying an American court order arising out of an antitrust proceeding to return the Nylon patent to the American du Pont corporation. The British justice said: "It would be quite wrong to suppose that a court of foreign jurisdiction has power to impose on a company domiciled in this country (the United Kingdom) an order which would compel it to break contracts entered into quite properly in this country."

Sicilian Tests

New firm plans two wells on results of exploration

TEST drilling is scheduled to be undertaken shortly in Sicily by one of the two oil organizations now doing exploratory work on the island.

The drilling program will be launched by the newly organized Mediterranean Oil Co., which is an amalgamation of the interests formerly held separately by Gulf Oil Corp. and MacMillan Petroleum Corp.

MacMillan has been interested in Sicily since 1947 when it began geological surveys of six years. The firm took out permits and applications on areas totaling nearly 400,000 hectares, and these were converted to about 100,000 hectares under the petroleum law which became effective in Sicily in 1950. MacMillin's four areas are in central Sicily and on the southern coast.

Two years ago Gulf negotiated a concession for its American International Fuel & Petroleum Co. covering 100,000 hectares roughly surrounding Ragusa in the southeast part of the island. Gulf has completed a aero-magnetometer survey which is reported to have shown the presence of structures at considerable depth.

The third operator exploring in Sicily is D'Arcy Exploration Co., Ltd., (Anglo-Iranian) which is studying the prospects in three areas totaling 100,000 hectares, one near Augusta on the east coast, another west of Gulf's area, and a third north of Licata on the south coast.

Deep tests possible . . . Discussing the Gulf-MacMillan plans recently in Rome, James Harry MacMillan, director of foreign operations for MacMillan, said that the tests will be taken to 12,000 ft. if necessary. He said preliminary work over the last 4 years has given strong evidence of the existence in Sicily of oil and gas in commercial quantities. He said two wells costing around $300,000 are planned in the immediate program.

Besides these two major groups, several smaller companies are preparing to undertake exploration in the island. Sicily's 1950 petroleum law was passed under the regional autonomy held by the territory. It paved the way for possible work by foreign oil firms. The lack of suitable legislation in Italy itself so far has prevented participation by foreign capital in exploration in that country.

Esso Refinery Opening Set

The new 25,000-bbl. refinery which Esso Standard Refinery, S. A., is building at Antwerp is scheduled to come on stream in the second quarter of next year.

The plant is designed to operate on Middle East crude and includes a fluid catalytic cracking unit of about 8,000 bbl. daily capacity and reforming capacity of about 4,000 bbl. daily. Facilities for L.P.G. manufacture will become available in 1954.

The Esso plant is the second large refinery built in the last few years at Antwerp. On June 23, the new 30,000-bbl. daily refinery owned jointly by Petrofina and Anglo-Iranian Oil Co., Ltd., was officially dedicated.

A.I.O.C. Expands Oil Ports

Anglo-Iranian Oil Co., Ltd., has expanded the capacity of its oil ports in Britain in line with the enlargement of its refineries.

Four deep-sea jetties for crude and products, together with a lubricating-oil jetty, are under construction at the Kent refinery which is expected to go into operation within the next month or two.

These jetties at Kent will be able to accommodate any size vessel from 100-ton river barges to 32,000-ton tankers at all states of the tide.

PERSONALS

I.P.A.A. President

C. H. Lyons plays active part in industry affairs

CHARLTON H. LYONS, Shreveport independent oil man, is winding up a successful term as president of the Independent Petroleum Association of America.

New officers will be elected at the association's annual meeting in Oklahoma City October 23 and 24. Lyons served as vice president, director, and a member of the executive board of I.P.A.A. before his election as president.

He also has been I.P.A.A. Louisiana vice president and chairman of the association's Western Hemisphere Oil Study Committee.

Lyons began his career as an attorney after receiving his law degree from Tulane University. He practiced law several years in Winnfield, La., and Shreveport before entering the oil business as an independent.

He is a member of the natural resources committee of the United States Chamber of Commerce. He also is a past vice president of the Louisiana-Arkansas division of the Mid-Continent Oil and Gas Association.

In addition to his oil activities, Lyons is active in civic work. He is secretary and a member of the board of trustees of Centenary College and formerly was director of the local Chamber of Commerce and Y.M.C.A.

Howard W. Page has resigned as a director of Esso Petroleum Co., Ltd., London, to assume additional duties for Standard Oil Co. (N. J.) in regard to European problems. Page, who formerly was executive assistant to the president of Jersey Standard, will continue to serve as shareholders' representatives for the firm in the United Kingdom.

Al Gillis has joined the geological staff of Calvert Drilling, Inc., at Olney, Ill.

J. C. McPike, geologist for Cities Service Oil Co. (Del.), at Houston, has been transferred to the evaluation department at Bartlesville, Okla. He replaces **G. H. LaPiere,** who has resigned.

George Charlton, graduate of the University of Sheffield, England, has joined Cities Service Petroleum Corp. at Calgary, Alta., as a geologist.

Maurice E. Smith, who joined Husky Oil Co., Cody, Wyo., in 1950, has been appointed assistant to the president.

A. LUNDSTRUM

Allan W. Lundstrum, vice president and general manager of Ohio Fuel Gas Co. since May 23, 1951, has been elected president, succeeding the late William N. Grinstead. Lundstrum has been succeeded by **Everett D. Bivens,** formerly treasurer of Ohio Fuel and since 1951 vice president and general manager of United Fuel Gas Co., Charleston, W. Va., and its six affiliated companies. Ohio Fuel and United Fuel are subsidiaries of Columbia Gas System, Inc. Former positions held by Lundstrum include: consulting engineer for Stewart Warner Corp., deputy director for the Office of War Utilities, president of Heating Research Corp., a subsidiary of Stone & Webster, Inc., and director of research for United Gas Pipe Line at Shreveport, La.

Ed P. Hempen, toolpusher for Dakota Basin Drilling Co., Inc., has been transferred from Piedmont to Rapid City, S. D.

F. T. Jones has returned to Cities Service Oil Co. as a petroleum engineer at Olney, Ill., following 18 months with the armed forces in Korea.

Wilbert S. Larson has resigned as geologist for Chemical & Geological Laboratories, Casper, Wyo., to join Canada Southern Oils, Inc., there.

C. J. Deegan, formerly with Cummins & Brinkerhoff, Fort Worth, has resigned and will engage in consulting work. He was formerly associate editor of The Oil and Gas Journal in charge of field reports and petroleum exploration.

Robert B. Ray has resigned as petroleum engineer for Magnolia Petroleum Co. at Wewoka, Okla., to accept a similar position with **G. Y. McCoy** at Dallas.

James H. Marks has been appointed general superintendent of distribution for Equitable Gas Co., Pittsburgh. Marks, who joined the company in 1935, formerly was superintendent of the north-side division of the distribution department.

Edwin F. Nelson has been elected president and general manager of Lake Superior Refining Co., Superior, Wis. Officers reelected by the board of directors include **H. J. Underhill,** vice president; **R. A. Crawford,** secretary; and **Leslie Olsen,** treasurer. Nelson formerly was vice president.

Lafayette B. Herring, Houston geologist, has been elected vice president and a director of Trans-Tex Production Co.

W. H. Haught has been appointed superintendent in the Haynesville, La., district for Mid-Valley Pipeline Co. He will supervise operation of five pump stations and all line maintenance. **Henry Zey** has been transferred to the Haynesville district as maintenance foreman, replacing **R. L. Sturrock,** who was transferred to Oxford, Miss.

Edward A. Nanton has been elected president of Calgary & Edmonton Corp., Ltd., succeeding the late Col. L. D. M. Baxter. **John F. Merriam** and **Gordon P. Osler** have been elected directors.

L. L. Grubb has been transferred by Cities Service Oil Co. (Del.) from the gasoline and chemical plant at Tallant, Okla., to the Wichita gasoline plant as superintendent in charge of operations and maintenance. **A. K. (Al) Osment** has been named assistant superintendent in charge of liquefied petroleum gas distribution at the Wichita plant, replacing L. E. Jester, deceased. Other company changes include: **Frank Snider,** transferred from the Maud, Okla., chemical plant to Tallant as adminis-

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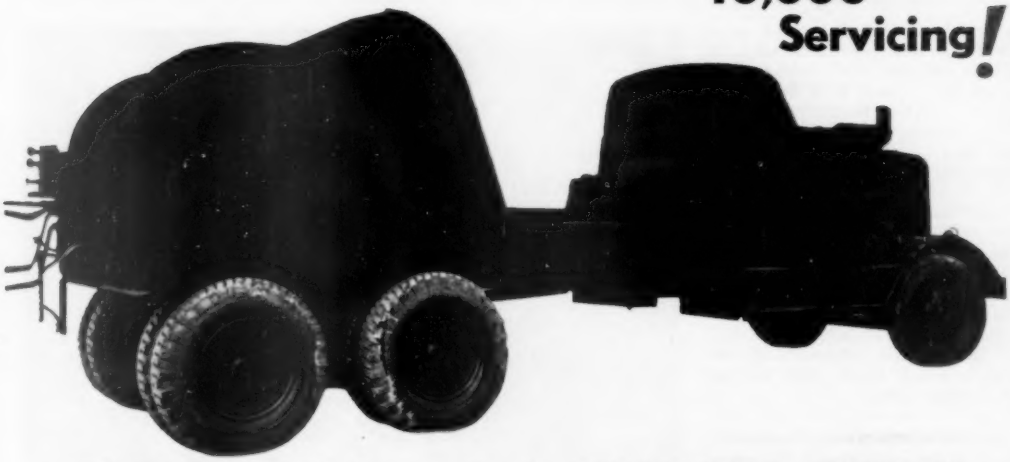

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trative assistant; **Jack C. Robison,** transferred from Maud to Lowell, Mich., to assist in operation of the underground-storage project there; **B. O. Buck,** Pampa, Tex., and **Guy Duren,** Wichita, district engineers, transferred to Bartlesville, Okla., as members of the process engineering staff.

Gene Gattis, formerly a geologist for Pure Oil Co. at Olney, Ill., has been appointed district geologist for Union Oil Co. at Bismarck, N. D.

J. T. Watson, Jr., has joined the staff of George & Wrather, Mount Carmel, Ill., as a petroleum engineer. He formerly was with Illinois Mid-Continent Co., Mount Carmel.

Fred A. Shellhorn, who has been in charge of the transportation division of Anchor Petroleum Co. since 1946, has been elected a vice president.

John M. Heller, engineer for Gulf Oil Corp. at Tulsa, has been transferred to the company field office at Vernal, Utah.

Warner E. Life, formerly district petroleum engineer for Skelly Oil Co. at Shreveport, La., has been appointed senior engineer for Southern Production Co., Inc., at Fort Worth.

R. O. Haas has joined the staff of Campbell & Rickman, Evansville, Ind., petroleum consultants, as a petroleum engineer.

B. B. Balke, chief gager of the northern division of Magnolia Pipe Line Co., has been promoted to assistant superintendent of the Healdton, Okla., district. Other company changes include: **Elmer E. Adams,** gager foreman at Maud, Okla., promoted to chief gager of the northern division, with headquarters in Healdton; **A. T. Pasche,** assistant mechanical engineer at general offices in Dallas, transferred to Midland, Tex.; **B. G. Christopher,** junior mechanical engineer, promoted to assistant mechanical engineer and transferred from the telephone and telegraph department to the mechanical engineering department in Dallas; **D. H. Handley,** junior mechanical engineer, promoted to assistant mechanical engineer and transferred from the telephone and telegraph department to the Healdton pipe-line district, and **R. C. Davidson,** assistant construction foreman in East Texas, promoted to construction foreman at Corsicana, Tex.

Form Oklahoma City Geophysical Group

Here are the officers of the newly formed Oklahoma City section of the Society of Exploration Geophysicists. Sixty-two exploration geophysicists from Oklahoma City, Shawnee, Clinton, Anadarko, and Ardmore met in Oklahoma City September 8 to establish the organization. In the front row, left to right, are: Richard M. Davis, Carter Oil Co., president; George Dunn, Stanolind Oil & Gas Co., first vice president; and Eric Thomsen, Stanolind Oil & Gas Co., treasurer. In back, left to right, are: Arnold Bleyburg, Gulf Oil Corp., alternate representative to the Society of Exploration Geophysicists; Paul Warren, Continental Oil Co., second vice president; James Finley, Continental Oil Co., secretary, and John Hill, Carter Oil Co., district representative to the S.E.G. The first official meeting will be October 30 at the Y. M. C. A. in Oklahoma City.

Allen D. Williamson, a recent geology graduate of the University of Illinois, has joined the staff of Theodore G. Glass at Mount Vernon, Ill.

Carl Ikard has been appointed to the newly created post of superintendent of gathering in the Hugoton pipe-line division of Northern Natural Gas Co., Omaha. Ikard, formerly assistant division superintendent at Hugoton, will be in charge of well operations. He joined Argus Natural Gas Co., Inc., a Northern subsidiary, at Garden City, Kans., in 1931 and transferred to Northern in 1943.

Francis M. Pate has been promoted by Magnolia Petroleum Co. from foreman at the Seeligson gasoline plant to assistant superintendent of the Vanderbilt district. In his new position he will be in charge of the Vanderbilt gasoline plant and other gas interests in the Vanderbilt and Luling areas. **Charles A. Freeman,** foreman of the Sholem Alechem gasoline plant near Healdton, Okla., has been appointed foreman of the Seeligson plant. **A. P. Lobrecht,** district engineer of the Healdton natural-gas district, has been named to succeed Freeman.

Robert J. Goodwin, formerly a petroleum engineer for Ohio Oil Co. at Orange, Tex., has been appointed a research technologist for the Texas Petroleum Research Committee at Texas A. & M. College, College Station.

James A. Collins, chemical-engineering graduate of Purdue University, has been employed in the cracking group in the Esso Standard Oil Co. refinery at Baton Rouge, La.

Carl G. Herrington, manager of production for Carter Oil Co., has been elected a company director. He began his 18 years of continuous service with Carter as a roustabout and was appointed a petroleum engineer in 1937. In 1944 he was named chief production engineer at Tulsa, and 2 years later became eastern division superintendent at Mattoon, Ill. He was named assistant manager of production in 1947 and manager a year later.

PERSONALS

Mahlon F. Manville has resigned as petroleum engineer for Sinclair Oil & Gas Co. at Gainesville, Tex., to join Johnston Testers, Inc., at Houston.

L. S. Wescoat, president of Pure Oil Co., has been appointed chairman of a National Petroleum Council committee to study the oil industry's needs for secondary storage.

T. N. Jordan, broker and operator, has been elected president of the North Dakota Oil and Gas Association. The association was organized recently at Bismarck with 70 charter members. Other officers include **Clay Murray,** Amerada Petroleum Corp., first vice president, and **Earl Cypert,** Magnolia Petroleum Co., second vice president.

Stuart Mossom has been transferred from Houston to Dallas, where he is assistant manager of the natural-gas department for Magnolia Petroleum Co. In addition to his new duties he will continue as coordinator of offshore operations for the company's exploration division.

C. C. (Sonny) Bankhead, consulting geological engineer at Abilene, Tex., has joined the staff of Avila Oil Co., Fort Worth. President of the company, which was organized last May, is **Chester M. Crebbs,** who retired as president of Mene Grande Oil Co., Caracas, Venezuela, in July.

S. A. Hallberg has been appointed to the new post of superintendent of the projects and materials division of Standard Oil Co. (Ind.). **John Graper** has been named to succeed him as supervisor of scheduling and dispatching.

William H. Midwinter, metropolitan field manager of asphalt sales on leave from Socony-Vacuum Oil Co., Inc., New York, has been appointed acting director of the distribution and marketing division of the Petroleum Administration for Defense. He succeeds **Lawrence W. Lee** who is returning to the vice presidency of the Husky Oil Co., Cody, Wyo.

Stanley C. Hope, president of Esso Standard Oil Co., New York; **R. C. Jopling,** vice president of Phillips Petroleum Co., Washington; and **F. W. Ayers,** senior vice president of Hughes Tool Co., Houston, Tex., have been appointed by the U. S. Chamber of Commerce to its 34-man manufacturers' department committee which advises the chamber's board of directors on policy and action in the field of major industrial problems.

Cecil L. Burrill, who is in charge of the New York office of Creole Petroleum Corp., has been elected vice president and director of the company. Before joining Creole in 1949 he was head of the budget department and a petroleum economist for Standard Oil Co. (N. J.). He recently returned to Creole following 18 months' service as director of the program division of the Petroleum Administration for Defense.

Garth L. Young, engineering trainee for Signal Oil & Gas Co. at Huntington Beach, Calif., has been appointed a junior observer with a geophysical exploration crew at Carlsbad, N. M.

J. L. Callahan has been promoted to utilities engineer for Service Pipe Line Co. at Tulsa. He will have charge of all contract negotiations with utility companies serving the company. He joined the company in 1946 and has aided in planning and designing several pump stations.

J. H. Frasher, who joined National Geophysical Co. of Canada in 1946 and has served as party chief and supervisor of field parties, has been appointed vice president.

Dr. Wilson Laird, North Dakota state geologist, has been appointed by Gov. Norman Brunsdale to serve on the Interstate Oil Compact Commission's research and coordinating and regulatory practices committee.

Eugene Holman, 57, president of Standard Oil Co. (N. J.), has been selected to receive the first annual State Fair of Texas "Texan of Distinction" award. He will speak at the State Fair annual banquet October 7, when the award will be presented.

Arnold Hols, expioitation engineer for Shell Oil Co., at Houston, has been appointed a reservoir engineer at Midland, Tex.

J. H. Russell, engineer-operator for Interstate Oil Pipe Line Co. at Wewoka, Okla., has been awarded a 30-year service pin by the company.

H. O. Harder, vice president of Sunray Oil Corp., has been named chairman of the general arrangements committee for the American Petroleum Institute Division of Production conference, to be held in Tulsa March 18-20, 1953.

DEATHS

John C. Lindsay, 68, retired civil engineer for Gulf Oil Corp., died at his Beverly Hills, Calif., home September 3.

Doyce Adamson, 26, architect for Continental Oil Co. at Ponca City, Okla., died September 4 of polio at a Stillwater hospital.

Dr. M. R. Schmidt, formerly general superintendent of the Standard Oil Co. (Ind.), Whiting refinery, died recently.

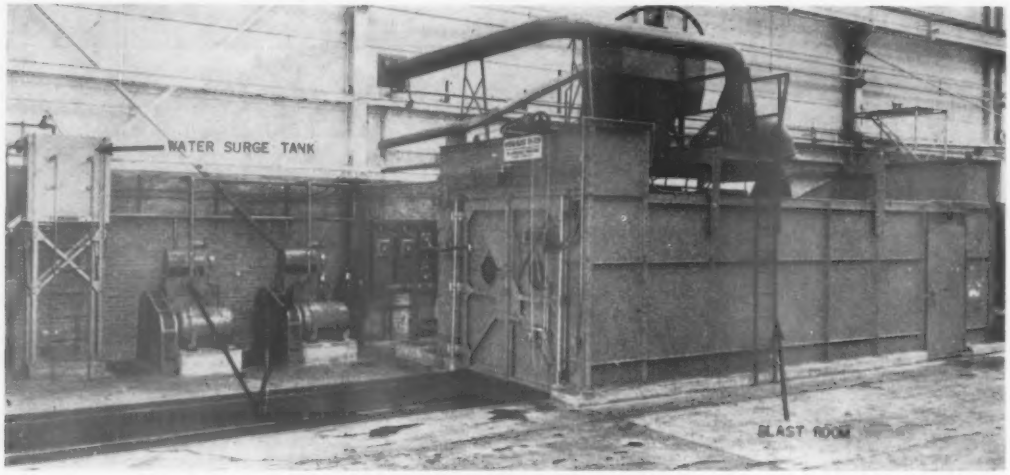
Kenneth W. Borror, 51, Mount Pleasant, Mich., land man for Sun Oil Co. the past 15 years, died in a Columbus, Ohio, hospital recently.

Thomas C. Farnan, Sr., 58, formerly chairman of the Rensselaer County Petroleum Institute, made up of major oil companies, their sales agents, and distributors, died September 2 at his home in Troy, N. Y.

Don Franz Tilden, 74, retired independent oil producer, died in Claremore, Okla., September 5. He started his career in Louisiana and came to Oklahoma in the early 1900's. He was a native of Renrock, Ohio.

Matt Steil, 80, who owned extensive oil and gas holdings in Oklahoma, died in a Tulsa hospital September 8.

Emery A. Miller, 72, retired drilling contractor, died September 7 at his home in Bartlesville, Okla. A native of Ohio, he came to Bartlesville in 1913 and was active in oil development until his retirement in 1946.



. BLAST ROOM measures 30 by 11 by 8 ft. and is fabricated from structural sections and plate. Fig. 1a.

SCRUBBING WITH SAND CUTS COSTS

High-Pressure Wet Sandblasting Cleans Esso Refi

by T. J. Innes* and J. L. Nanney*

One man can now clean a tube bundle, pump casing, or other item in half the time required by two to four men using older methods

FOR many years efficient cleaning of refinery equipment such as tube bundles, tower trays, pump casings, and other items has constituted a major problem for oil refineries in their efforts to reduce manufacturing costs.

As a result of studies made of cleaning costs, many cleaning methods are used in an attempt to secure the most efficient procedure. Some of these are scraping and drilling, dry sandblasting, chemical soaking in vats, and chemical cleaning in place.

Where it is mechanically feasible and permitted by process operations, chemical cleaning in place is probably the most economical method due to the lower labor costs and smaller amount of service time lost by the equipment. Unfortunately, this cleaning method is possible only on a small percentage of installations, and it is necessary to use mechanical cleaning for the majority of the work.

Wet sandblasting . . . In order to reduce labor costs of mechanical cleaning, the Baton Rouge refinery of Esso Standard Oil Co. installed facilities for high-pressure wet sandblasting approximately a year ago. This method has been used in other industries for some time, but it has only recently been introduced to refinery-cleaning problems.

One man can now clean a tube bundle, pump casing, or other items in about half the time required by two to four men using older methods, and the completed job is equal to or better than that achieved by most practices. Depending upon the nature of the deposit to be removed, results indicate that exchangers and other items can be effectively cleaned by the unit alone or by using it as a supplement to chemical cleaning in vats and manual cleaning.

Description of Facilities

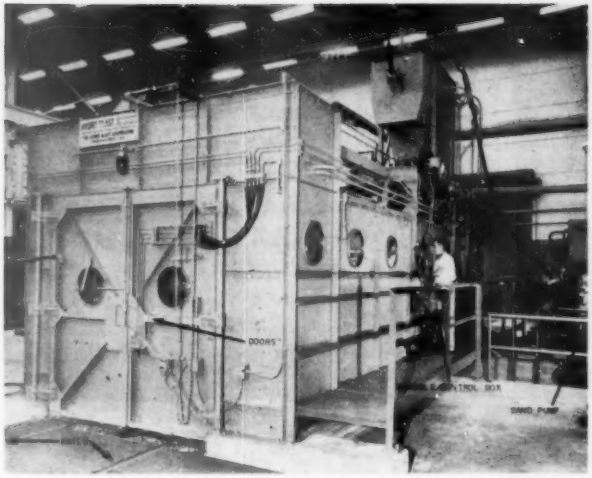
The blast unit is located in the central mechanical building of the Baton Rouge refinery. Equipment to be cleaned is brought to the building by straddle trucks or other modern materials-handling equipment. After the item has been unloaded, its movement within the building is accomplished by fork-lift trucks, overhead cranes, and a specially designed work car.

The unit presently being used for high-pressure wet sandblasting is a Hydro-Blast manufactured by Hydro-Blast Corp., Chicago. The blast room is 30 ft. long, 11 ft. wide, and 8 ft. high and is fabricated from structural sections and plate (Fig. 1). Each end ot the room has double swinging doors and an access door is provided in the wall on the side opposite the operator. Each door has a warning light mounted over it which is automatically switched on when the high-pressure water pumps are put into operation.

Twelve observation ports which are approximately 17 in. in diameter are provided to give the operator good visual control of the work. Eight of the ports are located in the operator's side of the room and one in each of the sections of the end doors.

The interior of the blast room is illustrated by Fig. 2. The floor is covered by a subway-type grating supported on structural-steel floor beams and designed to carry a 4,000-lb.-capacity fork-lift truck when loaded. Illumination for the blast room is provided by six special 500-watt marine-

*Esso Standard Oil Co., mechanical engineering department.



MOVABLE CONTROL BOX is mounted on rails outside blast-room walls. Fig. 1b.

BLAST-ROOM INTERIOR, showing grating-covered floor. Fig. 2.

nery Equipment

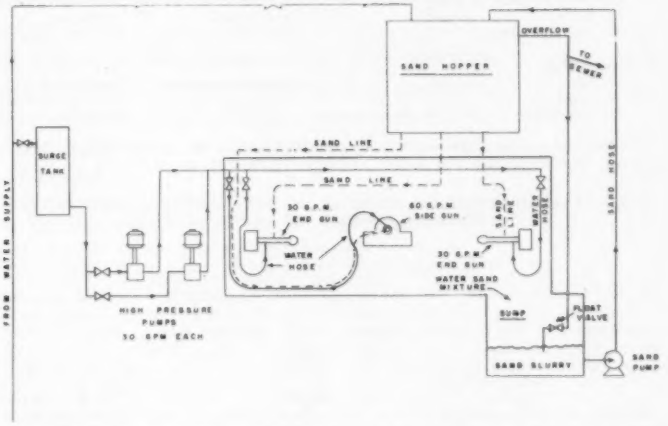
type floodlights equipped with impact and heat-resistant lenses.

Blast guns . . . The blast room has three high-pressure blast guns mounted inside. There is one side gun (Fig. 2) which has a capacity of 60 g.p.m. at a pressure of approximately 1,500 psi. The nozzle of this gun has a hydraulic mechanism that gives movement to the nozzle in the gun mount, thereby permitting changes in the angle of the blast stream. This gun is mounted on rails located along the inside of the room on the operator's side. Horizontal and vertical movements of the gun are effected by electric motors. All movements of the nozzle and carriage are controlled by the operator from a movable control box mounted on rails along the outside of the wall. (Fig. 1b.)

There are two end guns (Fig. 2), one being mounted at each end of the room. Each of these guns has a capacity of 30 g.p.m. at approximately 1,500-psi. pressure. The nozzles on these guns are rigidly mounted, thus allowing no change in the angle of the blast stream. The mounts have hydraulic controls which allow horizontal movement for one-half the width of the room. They can be moved vertically the height of the room by means of a manually operated winch. This allows the guns to be moved out of the way when material to be cleaned is being brought into the room or when the side gun is in operation.

Two special high-pressure triplex reciprocating water pumps are used with this unit. Each has a capacity of 30 g.p.m. at a maximum pressure of 1,600 psi. and is powered by a 40-hp. electric motor.

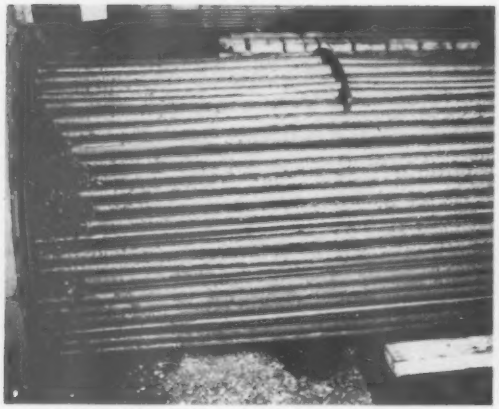
The sand sump is of concrete construction and is equipped with a removable basket screen to catch oversize particles of rust or other materials removed from the items being cleaned. After the sand passes through the screen, it is slurried to the sand pump. This pump is a special abrasive-resistant vertical centrifugal type which will convey approximately 140 lb. of sand per minute in a water slurry from the sump to a sand hopper located above the blast room.

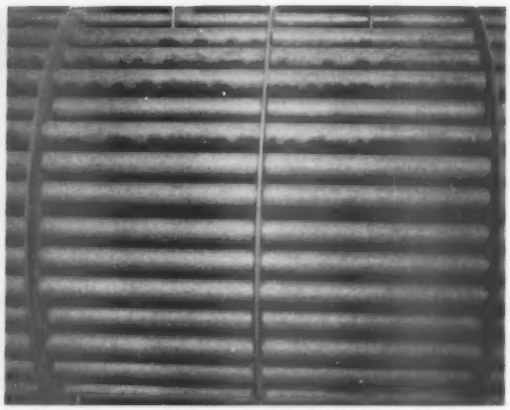


SIMPLIFIED FLOW DIAGRAM of Esso's Baton Rouge sandblast unit. Fig. 3.

Operation of the Unit

A simplified flow diagram of the unit is shown in Fig. 3. Well water is supplied to both the surge tank and the sand hopper. It flows from the surge tank to the high-pressure pumps which raise the pressure to approximately 1,600 psi. and deliver it to the guns. From the capacities shown, it may be





TYPICAL TUBE BUNDLE as brought to the unit and the same bundle after cleaning. Figs. 4a and 4b.

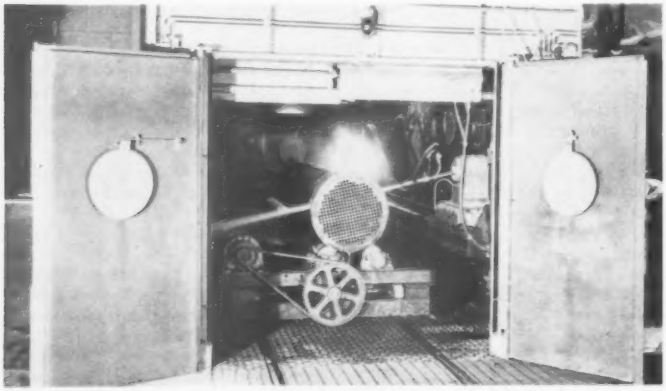
TABLE 1—TABULATION OF RESULTS OBTAINED BY CLEANING TUBE BUNDLES BY HIGH-PRESSURE WET SANDBLASTING

Type of deposit—	Shell-side results	Tube-side results
1. Carbonaceous:		
(a) Soft, buttery	Complete removal	Complete removal
(b) Oily, granular	Complete removal	Complete removal
(c) Tarry	Ineffective*	Ineffective†
(d) Thin, powdery	Complete removal	60 to 70% removal
2. Water deposits:		
(a) Silt	Complete removal	Complete removal
(b) Algae	Complete removal	Complete removal
(c) Iron oxide	Complete removal	Ineffective‡

*Alternate method: Chemical soaking plus high-pressure wet sandblasting. †Alternate method: Chemical soaking plus drilling. ‡Alternate method: Chemical soaking.

TABLE 2—COMPARISON OF INCREASE IN HEAT-EXCHANGE COEFFICIENTS OBTAINED BY SEVERAL CLEANING METHODS

		Heat exchange coefficient, B.t.u./hr./sq.ft./°F.					
		Mechanical cleaning		High-pressure wet sandblasting		Chemical cleaning	
Tube bundle	Type of deposit	Before	After	Before	After	Before	After
Bundle No. 1	Soft flaky	8.0	18.0	8.0	22.0		
Bundle No. 2	Soft carbonaceous	47.0	99.0			49.0	109.0
Bundle No. 3	Soft carbonaceous			12.0	65.0	33.0	76.0
Bundle No. 4	Algae and iron oxide	112.0	180.0			124.0	453.0
Bundle No. 5	Soft carbonaceous			54.0	94.0	46.0	82.0



PROPER ALIGNMENT of blast stream with tube spacing allows the stream to be sent completely through bundle with minimum amount of diffusion or loss of velocity. Fig. 5.

seen that either the side gun or one or both end guns may be used at any one time.

Sand system . . . Special sand hoses lead from the sand hopper to the guns and the sand is sucked in a water slurry through these hoses and into the stream by venturi action of the nozzle. The sand and water mixture, containing removed rust or scale, falls through the floor grating and is washed to the basket screen. The sand, water, and entrained fines are washed through to the sump while the larger particles are caught by the screen. The sand pump picks up the sand slurry in the sump and carries it to the sand hopper to complete the cycle.

One section of the hopper is a small settling basin in which there is sufficient agitation to keep the sand in suspension, but allows heavier particles resulting from the cleaning operation to settle out. This chamber is cleaned periodically to remove this material. The hopper is also equipped with an overflow line to take off excess water to the sewer. This overflow carries off a large part of the fines which remain in suspension after the sand is allowed to settle out in the feed chambers of the hopper.

Cleaning procedure . . . The tube bundles or other materials to be cleaned are carried into the blast room on a steel work car. This car is equipped with one set of stationary positioning rollers and one set of movable idling rollers. With this arrangement, the car can accommodate the largest and the smallest tube bundles. The stationary rollers are connected to a chain drive actuated by an electric motor which rotates the roller that, in turn, rotates the tube bundle about its longitudinal axis. *(Continued on page 115)*

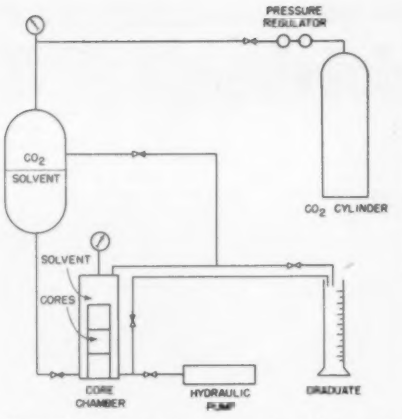


Fig. 1—Sketch of one type of apparatus used to apply cleaning method.

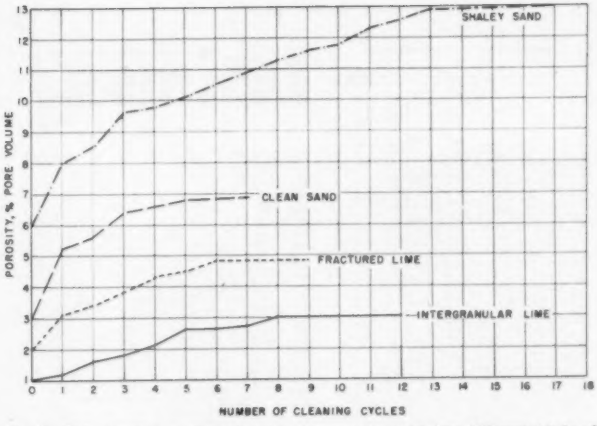


Fig. 2—Data showing number of cycles necessary to clean four different kinds of formations.

How to Analyze Large Core Samples

The increasing importance of limestone and dolomite formations as oil reservoirs has stimulated efforts by the producing oil industry and progressive core analysis companies to develop apparatus and techniques for the analysis of large, full-diameter core samples.

by Charles R. Stewart* and J. W. Spurlock*

THE inaccuracy of small-sample core analysis in certain types of reservoir rock has been recognized for quite some time. As a specific example, it is apparent that porosity and permeability measurements on a 1-in.-diameter sample from a vuggy or solution cavity limestone will never be representative of true formation characteristics simply because the pore openings and the core sample are in the same order of size.

Also, limestone or dolomite formations which have a system of fractures cannot be analyzed accurately because the fracture system makes it practically impossible to use a small core plug. It is true that a large number of small plugs can in certain cases provide data of comparable accuracy to large core data. However, in such cases, the number of small plugs necessary can increase the cost above that for the analysis of the whole core itself.

When considering the analysis of large limestone and dolomite samples, several problems immediately become apparent. First, consider the major problem of cleaning the core of oil and water prior to the measurement of porosity and permeability. One of the small plug techniques of using a Soxhlet extractor with solvent is of no value because of the time factor involved. Another possible procedure of flowing solvent through the sample by means of high pressure is not satisfactory. For example, in a fracture type of porosity, practically all of the solvent flows through the fractures with little or no cleaning of the remaining tighter pores.

Next, consider the problem of the measurement of permeability. Depending upon the way in which the oil reservoir is being produced, permeabilities in both vertical and horizontal directions may be necessary. This in itself precludes one permeability method in which a small-diameter hole is drilled through the center of the core and a horizontal measurement is taken. Another objection to this method is that it reduces the flow path length to one-half that available and in effect is the same as reducing the sample size. The most satisfactory permeability method must utilize the maximum diameter of the core.

Another problem appears in the measurement of porosity. One of the most satisfactory porosity methods is based on the use of the pressure and volume relationship for a gas. This method does not change the sample characteristics in any way, a point of increasing importance when considering future tests for reservoir engineering studies. However, due to the large sample size, the time for a porosity determination is increased over that for a small sample and a technique to reduce this to a practical value is desirable.

The following parts of this article will present the details of (1) a cleaning method which successfully cleans any type of porosity in a practical time interval, (2) a method of determining permeability which utilizes the longest flow path length of the sample, and (3) a modified Coberly-Stevens porosity method in which the time of analysis has been reduced to a minimum and practical limit, and (4) some preliminary core analysis data collected during the development of the preceding methods and their application to routine testing of core samples.

*Stanolind Oil & Gas Co., Tulsa.

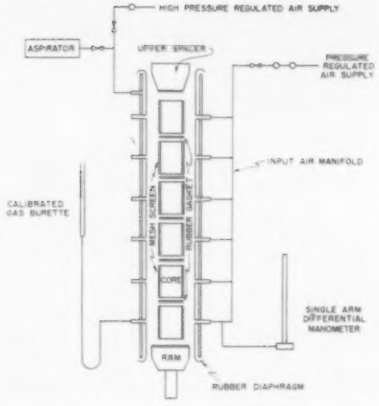


Fig. 3—Diagrammatic sketch of multiple sample permeameter which can accommodate 24 in. of total core.

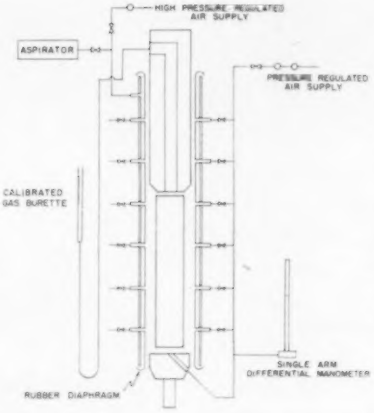


Fig. 4—Showing the arrangement of the permeameter for vertical permeability measurements.

Core Cleaning Method

The principle involved in this method (United States and Canadian patent applications on file) of cleaning large core samples is simply one of subjecting the core to repeated cycles of internal dissolved or solution gas drive until the core is clean of residual oil and then removing the residual solvent and water by means of a drying oven.

In further explanation, consider a core from an oil-bearing formation which has been brought to the surface and depressured. The reduction of the pressure to atmospheric allows the gas dissolved in the oil to come out of solution and push some of the oil out of the core. This leaves the core sample with some of the pore space filled with atmospheric pressure gas.

The gas-filled space is the factor which makes it possible to clean the core of its remaining oil. By surrounding the core with a suitable solvent containing a dissolved gas and applying sufficient hydraulic pressure, the part of the core filled with atmospheric gas can be almost completely filled with solvent. Under this condition, the solvent mixes with the oil and a subsequent depressuring to atmospheric removes some of the residual oil.

If this cycle is repeated a sufficient number of times, the core becomes practically oil free. The remaining solvent and water are then removed by vaporization. This method will clean any porosity, regardless of the type or complexity. It works in a crack or fissure system as well as in a pure intergranular type porosity. It is successful in the so-called dead end or one-opening type of porosity.

Fig. 1 is a diagrammatic sketch of one type of apparatus which is used to apply this cleaning method. It consists of a core chamber, a hydraulic pump, a solvent reservoir, and other miscellaneous items such as pressure gages and valves. Used solvent can be recovered if necessary by use of an auxiliary boiler and tower. The procedure for the use of this apparatus is as follows: The cores are placed in the core chamber through the open end. An O-ring cap is screwed in place and the chamber pressured up with gas to a pressure equal to the pressure of the gas dissolved in the solvent. Next, this gas is displaced at constant pressure by the solvent-gas mixture and then the chamber is pressured up by means of the hydraulic pump to approximately four or five times the solvent-gas pressure. When liquid flow into the cores ceases, the core chamber is depressured rapidly to atmospheric and the cores left submerged in solvent until most of the gas has flowed from the cores. The solvent is then drained off and the cycle repeated.

Carbon dioxide gas is excellent because

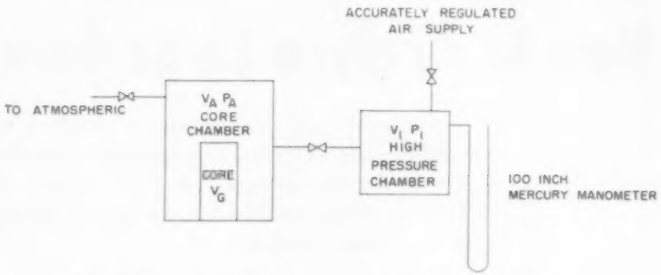


Fig. 6—Diagrammatic sketch of apparatus for porosity measurements.

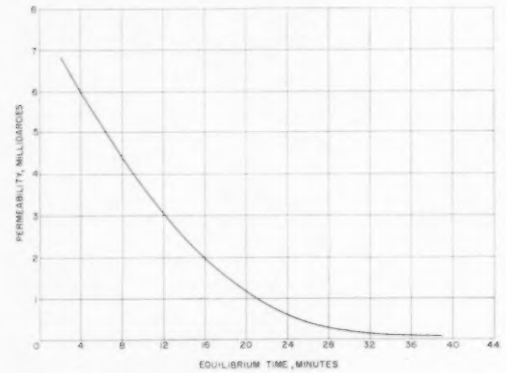


Fig. 5—Approximate equilibrium time for cores of various permeabilities.

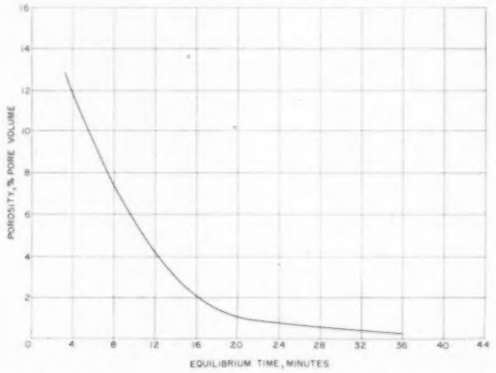
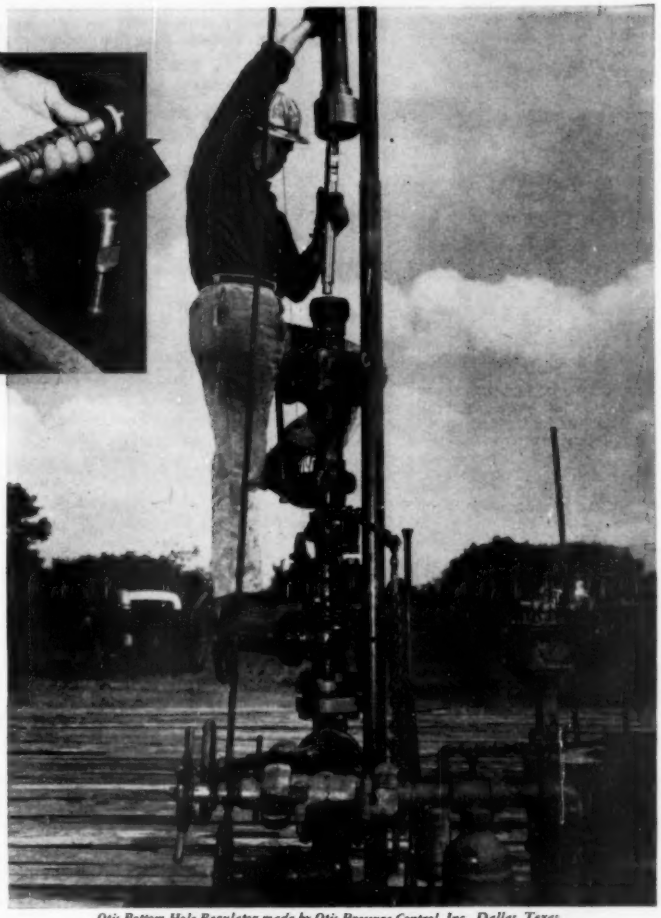


Fig. 7—Maximum and minimum times to reach equilibrium in porosity test.

Another new development using

B. F. Goodrich Chemical *raw materials*



Otis Bottom Hole Regulator made by Otis Pressure Control, Inc., Dallas, Texas. B. F. Goodrich Chemical Company supplies the Hycar rubber only.

Hycar-sealed "ROOT" keeps Christmas tree from freezing!

THIS bottom hole regulator does a vital job in preventing the freezing of the Christmas tree and flow lines due to pressure drop—and Hycar helps it in two important ways.

A Hycar rubber packing ring is set between the valve seat and the outer edge of the regulator. Its first job is to provide a tight seal, to prevent bottom hole pressure from bypassing the valve seat and entering the tubing above the regulator. Its second job is to resist deterioration from oil and gas—which Hycar does to perfection. For if the seal should deteriorate, icing would occur—making it necessary to pull the regulator from the well, replace the seal, and re-install the regulator. All jobs that consume time—run up costs.

Hycar helps out so well in this petroleum application, and in many others, because it resists oil, gas, abrasive mud, many chemicals, heat and cold, weather and wear. Perhaps one of the many Hycar rubber compounds can help you solve a problem—improve or develop a product. For helpful technical advice on Hycar, please write Dept. HI-10, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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"Largest core size possible is necessary for permeability measurements."

of low fire or explosion hazard and high solubility in most solvents. Some of the solvents which can be used are naphtha, benzene, toluene, carbon tetrachloride, and mixtures of solvents. In the case of certain types of crude, cleaning time may be reduced if the core chamber is heated by a water or steam bath or electric heaters during the pressuring time. One successful application of this method for routine cleaning of cores uses carbon dioxide and toluene at 200 psig. with a hydraulic squeeze of 1,000 psig. Cycles of approximately 30 minutes are used.

Data showing the number of cycles necessary to clean four different types of formations are presented in Fig. 2. The core samples reported here were cleaned and dried and the porosity determined. They were then subjected to additional cleaning cycles and dried each time until the porosity showed no increase.

Fig. 2 shows a plot of cleaning cycles versus porosity for an intergranular type lime, a fractured lime, a relatively clean sand, and a shaly sand. The minimum number of cleaning cycles, five, was required for the clean sand and the maximum number of 14 was required for the shaly sand. The fractured lime required only six cycles, whereas the intergranular lime required eight. Because of the fracture system, the cleaning solvent was able to penetrate to the center of the core more easily in the fractured lime than in the intergranular lime which had no fracture system. All samples were broken open after the cleaning experiment and examined under an ultraviolet lamp. There was no fluorescence which is additional proof of the efficiency of the cleaning process. It should be realized that the type of crude will also play an important part in determining the number of cycles necessary for cleaning. In any one type of porosity a heavy asphaltic crude will require more cycles than a high gravity crude.

Permeability Method

When considering the size of pore spaces which are encountered in limestones and the frequent presence of added fracture porosity, it is apparent that the largest core sample possible is necessary for permeability measurements, and the longest flow-path length available should be used.

For horizontal permeabilities on a cylindrical core, this means flowing the measuring fluid from an area along the length of the sample to a like area diametrically opposite the first area. However, this immediately presents a problem in determining the true flow-path length to be used in the Darcy equation for permeability.

Considering this problem geometrically, it is apparent that the simplest condition of flow is when the circumference of the core is divided into quarters and the two diametrically opposed quarters are exposed to flow over the length of the sample. Using a mean flow-path length for this condition, a permeability equation can be written as follows:

$$K = \frac{Q}{L_m h} \frac{L_m}{\Delta P} \mu$$

which simplifies to:

$$K = \frac{Q}{h} \frac{\mu}{\Delta P} \qquad (1)$$

where

K = permeability, darcies.
Q = rate of flow, cc./sec.
h = length of core, cm.
μ = viscosity of fluid, cp.
ΔP = differential pressure, atm.
L_m = mean flow-path length, cm.

The validity of the preceding equation has been checked by collecting flow data on a homogeneous sand core sample and then drilling a small-diameter hole in the center, making additional flow tests, and comparing the calculated permeability by the radial Darcy equation to the permeability by Equation 1. This equation has been verified by other investigators using electrical analogy methods.

Fig. 3 is a diagrammatic sketch of a multiple sample permeameter which can accommodate 24 in. of total core divided into 4, 6, 8, 12, or 24-in.-long samples. The permeameter apparatus consists essentially of a length of steel tubing carrying a rubber diaphragm in the interior. The diaphragm is sealed to the tube at each end and has two rows of six evenly spaced flow tubes diametrically opposed which allow flow across the core samples. A hydraulic ram in conjunction with rubber gaskets is used to seal the ends of the sample. The operation of the instrument is briefly as follows:

1. Vacuum is applied by means of the aspirator and the ram moved to the top of the instrument.
2. Preselected cores with screens attached are placed on top of the ram and the ram and cores lowered into position.
3. Ram pressure and air pressure to the diaphragm are then applied.
4. Air under pressure is then admitted to the upstream manifold and flows through each core individually. After stabilized flow is reached, the pressure drop and air flow rates for each core are measured and recorded.

Permeability can be measured in any horizontal direction by orienting each core sample. Vertical permeabilities can also be measured using this apparatus. A separate ram head and upper spacer containing surface grooves and connections to allow the flow of air through the sample from end to end are used.

Fig. 4 presents the arrangement of the permeameter for vertical permeability measurements. In this procedure the screens are absent and the manifold flow tubes are sealed by means of valves. If the core sample is less than 24 in. long, the upper spacer, which is of sufficient length, is used to fill the core holder.

The advantage of the multiple sample permeameter is in the reduction of time per sample for a permeability measurement. Preliminary work on the development of the

TABLE I—LARGE CORES VERSUS SMALL PLUGS

Sample No.	Formation	Permeability millidarcies: Large core Lineart	Large core Radial	Small plug* Average	Small plug* Individual samples	Porosity, per cent pore space: Large core	Small plug* Average	Small plug* Individual samples
6	First Wall Creek sand	0.14	0.85	0.13	0.17	3.5	5.8	6.9
					0.10			4.6
7	First Wall Creek sand	1.25	2.10	3.53	0.80	11.5	12.8	10.9
					6.26			14.7
17	Second Wall Creek sand	2.70	3.42	4.12	1.02	12.6	15.0	13.3
					7.22			16.8
301	Madison lime	10.70	42.40		.05	7.7	5.9	4.2
					0.44			7.5
3	Madison lime	3.24	3.68	0.25	0.40	5.6	6.4	10.4
					0.10			2.4
5	Madison lime	5.50	7.10	6.80	2.53	9.6	9.8	8.2
					11.20			11.4
25	Devonian chert	1.63	3.97	.05	.05	4.9	3.4	5.1
					.05			1.7
27	Devonian chert	1.28	2.91		.05	5.0	2.1	2.2
					0.17			2.0
28	Devonian chert	0.52	0.44	.05	.05	5.1	3.5	3.5
					.05			3.5
30	Devonian chert	21.70	18.30	16.70	11.70	23.7	32.5	32.9
					21.70			32.0
31	Devonian chert	31.20	51.10	34.70	49.0	27.8	30.6	33.1
					20.5			28.2
24	Devonian chert	21.00	14.20	0.30	0.16	6.2	6.1	4.4
					0.43			7.7
26	Devonian chert	3.28	4.37	0.26	0.41	6.0	3.5	5.3
					0.10			1.7
29	Devonian chert	17.28	17.55	15.68	26.40	31.4	28.3	31.0
					4.96			25.6
44	Devonian lime	10.50	35.30	20.12	7.74	12.1	11.9	12.1
					32.50			11.6
45	Devonian lime	0.58	1.33	0.90	0.20	3.5	3.6	3.4
					1.61			3.8

*Small plugs selected at random from 6-in.-long large core sample. †Average of maximum and 90° values.

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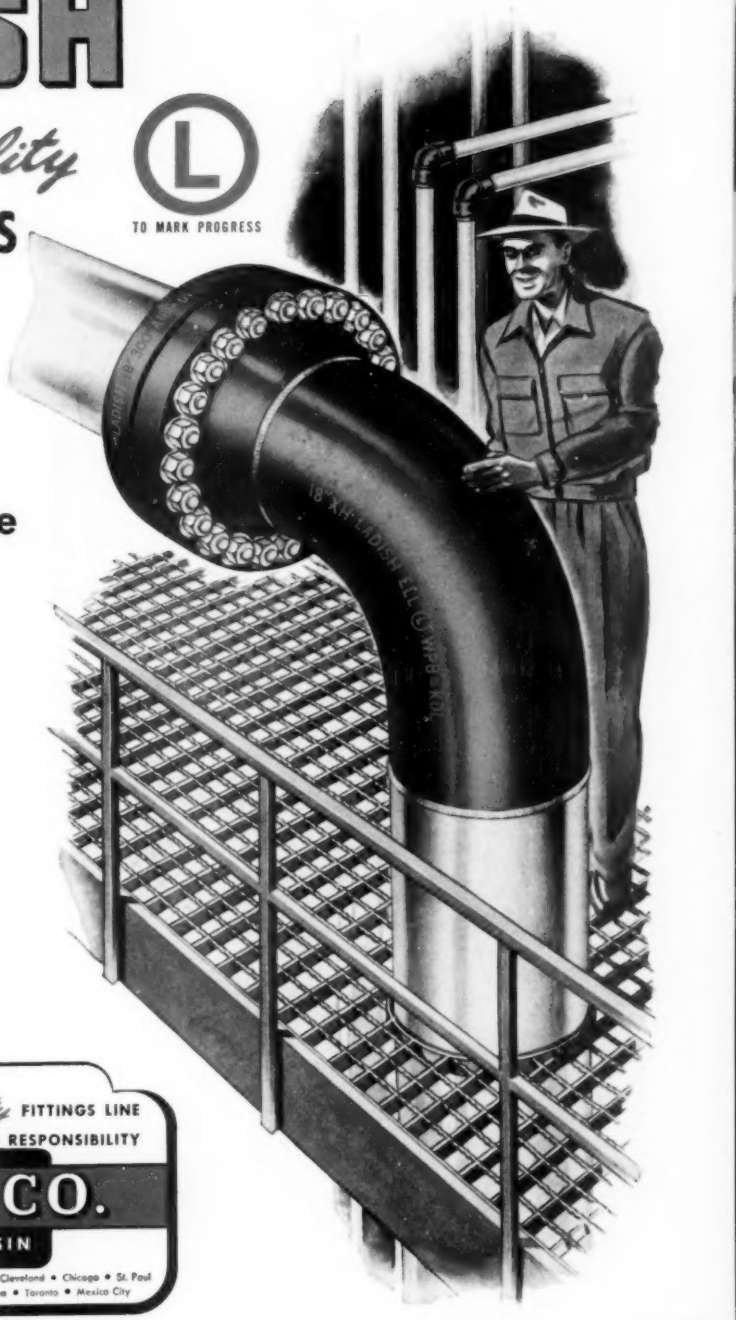

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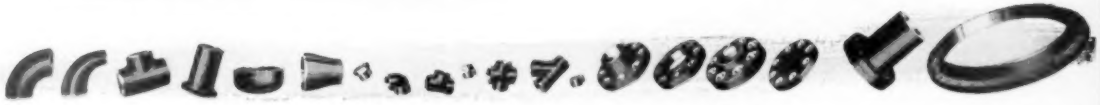

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Pictured above is an installation of HUDSON SOLO-AIRE JACKET WATER COOLERS providing cool water to the power cylinders, compressor cylinders, and lubricating oil coolers of ten 800 horsepower gas engine driven compressors. The coolers, using air as the cooling medium, and operating with inlet air temperatures ranging seasonally from below zero to 105° F, deliver cool jacket water at a *uniform, controlled* temperature the year around.

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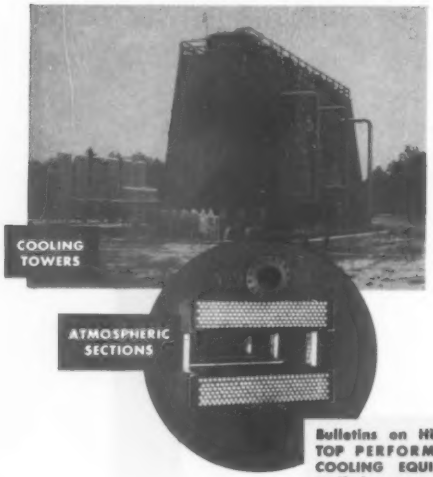

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apparatus using a single core holder designed for a 6-in.-long core sample showed that the time to reach equilibrium flow conditions, particularly in low-permeability samples, was of the order of 3 to 10 minutes. This was considered excessive. The solution to this was a multiple holder which could accommodate a number of samples simultaneously and thus reduce the over-all time per sample.

In actual operation for horizontal permeability, two measurements are made. The core is oriented by visual examination for the first measurement and gives the maximum permeability. The second measurement is made after rotating the sample 90° from its position during the first measurement.

The time to reach equilibrium in a permeability test varies over a wide range from a few minutes to as much as half an hour. Fig. 5 presents approximate equilibrium time for cores of various permeabilities. The cores for this test were selected at random to cover the range of porosity types encountered in routine analysis. Fig. 5 shows that cores having permeabilities greater than 6 md. reach equilibrium in less than 4 minutes, while very tight samples of less than 0.5 md. may require half an hour or more.

TABLE 3—LARGE CORES VERSUS SMALL PLUGS

Formation and porosity type—	No. of samples	Average porosity values per cent pore volume: Large core	Average porosity values per cent pore volume: Small plug	Average permeability values, md.: Large core	Average permeability values, md.: Small plug
Penn reef—Vugular	18	12.4	7.9	1,191.0	121.0
Canyon reef—Vugular	15	9.0	8.0	28.0	7.0
Viola lime—Vugular	4	5.2	3.4	11.0	0.1
Palo Pinto reef—Vugular	13	2.9	2.6	5.0	4.0
San Andres—Dense intergranular	13	9.5	7.0	1.0	0.6
San Andres—Dense intergranular	24	4.7	3.2	1.3	0.3
San Andres—Dense intergranular	9	7.6	5.9	5.0	2.0
Clearfork—Microfracture	20	11.2	8.1	1.9	0.4
Clearfork—Microfracture	20	6.8	5.8	4.6	1.7
Ellenburger—Macrofracture	11	3.2	2.3	243.0	26.0
Sycamore lime—Shaly lime	34	11.2	8.6	14.0	0.6
Pictured Cliffs—Clean sand	21	15.5	14.5	9.3	7.5
Pictured Cliffs—Clean sand	7	11.3	8.3	1.3	1.0
Springer—Clean sand	24	15.3	15.1	28.0	19.0
Yates—Shaly dolomite sand	54	11.3	9.9	35.0	9.0
Springer—Shaly sand	7	13.2	11.2	22.0	10.0

Porosity Method

Porosity as measured by gas expansion was selected as the most satisfactory for obvious reasons. In the many methods using this principle there is a minimum analysis time which depends upon the length of time for a gas to flow from a region of high pressure to a region of low pressure until the pressure in the two regions is substantially equal. In some of the methods, this time interval is approxi-

(Continued on page 120)

TABLE 2—LARGE CORES VERSUS SMALL PLUGS

Sample No.	Formation	Permeability millidarcies: Large core Linear†	Large core Radial	Small plugs* 0°	90°	180°	270°	Porosity, per cent: Large core	Small plugs* 0°	90°	180°	270°
16	Second Wall Creek sand			100.00	95.00	95.40	....		19.2	20.0	19.8	....
				42.70	89.10	84.20	....		19.7	19.7	19.4	....
				47.10	46.90	49.80	50.6		18.2	18.3	18.8	18.9
				55.70	130.80	139.10	....		18.2	20.2	20.2	....
				118.50	127.80	131.80	....		19.6	20.3	19.7	....
				86.50	108.00	112.00	....		19.0	20.1	20.0	....
		74.90	80.90	Average = 90.05 md.				19.7	Average = 19.4 per cent			
11	Tensleep sand			335.00	212.00	204.10	166.00		15.3	16.0	15.5	15.0
				252.00	226.00	152.50	241.00		16.1	15.1	14.5	15.2
				214.00	135.00	86.20	150.00		15.4	14.6	13.0	14.0
				81.60	44.50	65.00	107.00		12.5	12.7	13.1	14.5
		116.20	150.00	Average = 167.00 md.				13.9	Average = 14.5 per cent			
199	Madison lime			0.28	0.23	0.28	0.56		9.4	11.2	10.6	13.7
				0.15	0.19	0.28	0.19		7.9	8.7	10.7	8.7
				0.21	0.15	0.26	0.15		8.2	8.6	8.9	7.4
				0.40	0.28	0.15	0.18		7.8	9.4	7.2	10.8
				0.15	0.15	0.09	0.15		6.7	7.6	7.7	8.9
		0.21	0.18	Average = 0.22 md.				7.4	Average = 9.0 per cent			
2	Madison lime			1.15	0.79	0.52	0.97		8.0	8.0	9.4	10.0
				26.40	1.80	9.60	....		12.7	11.2	12.4	....
				57.50	1.28	208.20	0.89		14.3	9.3	16.0	13.8
				81.10	14.85	22.80	1.13		13.9	9.5	12.6	9.5
				53.80	....	3.90	3.15		13.4	....	9.8	9.8
		13.00	17.60	Average = 27.21 md.				10.3	Average = 11.3 per cent			
46	Devonian lime			0.97	5.38	1.73	0.49		5.6	5.0	6.1	5.4
				0.52	0.29	3.47	0.59		5.3	5.3	6.2	5.6
				0.20	0.57	0.75	1.37		5.4	5.2	4.2	5.4
				0.38	0.35	....	0.62		4.7	5.6	....	5.7
				0.34	....	0.63	0.35		4.4	....	6.2	6.0
				1.84	0.75	3.38	....		4.3	5.2	6.8	....
		1.30	1.88	Average = 1.19 md.				4.3	Average = 5.4 per cent			
47	Devonian lime			0.09	....	....	....		3.6	....	....	....
				2.62	0.19	0.19	0.09		9.2	5.8	5.8	4.5
				0.20	....	....	....		6.2	....	....	....
				0.19	....	....	....		5.3	....	....	....
		0.10	0.84	Average = 0.51 md.				4.5	Average = 5.9 per cent			

*Listed values run from top to bottom of core; samples were drilled from four equi-distant points on cores. †Average of maximum and 90° values.

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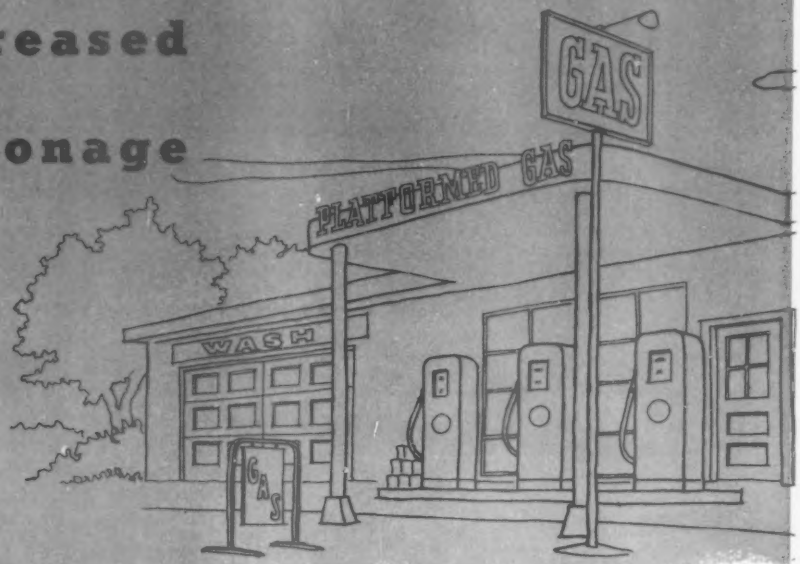

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A REPORT TO THE WHITE HOUSE

3—Petrochemical End Products

From "A Report to the President of the United States by the President's Materials Policy Commission, June 1952"*

MORE than 2,500 different chemical products are derived from petroleum and natural gas. Demands for these products are continually increasing, and other important chemicals will undoubtedly be produced as a result of continued research. There will, therefore, be much greater demand for these raw materials.

A survey of the important end products from petrochemicals was started in the Journal on September 1. This discussion is concluded here.

Plastics . . . The phenolic plastics have their largest use in molding structural materials, but are used also for laminating, adhesives, protective coatings, etc. Demand for 1955 is estimated at 850 million pounds, about double the 1950 production. The 1960 demand may be 950 million pounds. Chemical requirements for the phenol and formaldehyde required and for the benzene and methane from which these would be produced are shown in Table 1.

TABLE 1—CHEMICAL REQUIREMENTS FOR PHENOLIC PLASTICS
(Millions of pounds)

Year	Phenol	Benzene	Formaldehyde*	Methane
1955	375	346	265	175
1964	475	438	285	224
1975	825	761	495	328

*On a 100 per cent basis.

Polystyrene is used principally for molding materials. It is one of the most rapidly growing plastics. Production in 1950 was 50 times as great as in 1942. Because of synthetic-rubber requirements, the supply of styrene was insufficient to meet the demand in 1951, but capacity is being rapidly increased and should reach 750 million pounds in 1952. This would be about 400 million pounds above rubber requirements.

Total styrene requirements for 1955 have been estimated at over 1 billion pounds. It is estimated that styrene requirements for polystyrene plastics alone will be (in millions of pounds) 500 for 1955, 700 for 1960, and 1,500 for 1975. The benzene required for styrene production would be (in millions of pounds) 417 for 1955, 583 for 1960, and 1,250 for 1975; and ethylene required would be 135, 188, and 404 respectively.

*Original report to the commission by Dr. Gustav Egloff, Universal Oil Products Co., Chicago.

Urea and melamine resins, useful for adhesives, laminating, molding, textile, and paper treatment, have grown steadily but not spectacularly. A production (in millions of pounds) of 265 in 1955, 340 in 1960, and 570 in 1975, can be predicted. Table 2 shows the chemical requirements for this production.

TABLE 2—CHEMICAL REQUIREMENTS FOR UREA AND MELAMINE PLASTICS
(Millions of pounds)

Year	Urea	Ammonia	Formaldehyde*	Methane†
1955	99	99	169	135
1960	143	142	216	175
1975	245	243	363	299

*On a 100 per cent basis. †Includes methane for formaldehyde and carbon dioxide only for urea; does not include methane for ammonia.

Vinyl plastics in consumer goods . . . The vinyl plastics are used for raincoats, draperies, upholstery, garden hose, phonograph records, electrical insulation, etc., and they have had a phenomenal growth. Basic raw materials are ethylene or acetylene. Production could reach (in millions of pounds) 700 by 1955, 1,200 by 1960, and 2,000 by 1975. Chemical requirements (in millions of pounds) are for acetylene 323, 554, and 924 respectively for these years; or for ethylene, 387, 664, and 1,106.

The cellulose plastics have declined in importance. They may not increase appreciably. A total production (in millions of pounds) of 135 in 1955, 150 in 1960, and 175 in 1975 would seem reasonable. Chemicals required would be small in amount.

Among the miscellaneous plastics, the cumarone-indenes, polyethylene and acrylates, are the most important. Cumarone-indenes are used largely as a binder in asphalt floor tile. The acrylates (lucite, Plexiglass) are small in volume, but important in use. Polyethylene is probably the most important of these plastics. Production of miscellaneous plastics should total (in millions of pounds) at least 480 by 1955, 720 by 1960, and 1,700 by 1975.

New plastics will, of course, be developed in this period. The cumarone-indene plastics are not made from petroleum sources and are not here considered. Polyethylene production will probably increase (in millions of pounds) to 200 in 1955, 500 in 1960, and 1,000 in 1975.

A comprehensive estimate of petrochemical requirements for plastics is listed in Table 3. These are only part of the total requirements. They are subject to a number of limitations which must be carefully considered in evaluating the estimates.

Plasticizers

Total plasticizer requirements have been projected as 350, 480, and 900 million pounds for 1955, 1960, and 1975. Chemical requirements have been projected for only the largest class of plasticizers — namely, the phthalic anhydride esters. At present other derivatives are produced in greater quantity, but the diisooctyl phthalates will probably become most important. Assuming the latter represent the total production, requirements for them will be 210, 288, and 540 million pounds in 1955, 1960, and 1975. To produce these requirements, 70, 95, and 180 million pounds of n-heptene will be needed; and if the phthalic anhydride is made from o-xylene, 76, 103, and 195 million pounds will be needed.

Solvents

Solvents are among the most important end uses of petrochemicals. Very few statistics are available, however, on the quantities used. Probably 100 or more different compounds of petrochemical origin are used for this purpose. Many of them are used both as solvents and as intermediates for other

TABLE 3—PETROCHEMICAL REQUIREMENTS FOR MAJOR PLASTICS
(Millions of pounds)

Year	Ethylene	Acetylene*	Propylene	Methane	Benzene	m-Xylene	Ammonia
1955	972	373	209	370	763	196	99
1960	1,902	634	261	479	1,011	246	142
1975	3,710	1,124	462	777	2,011	491	243

*Partially alternative raw material with ethylene.

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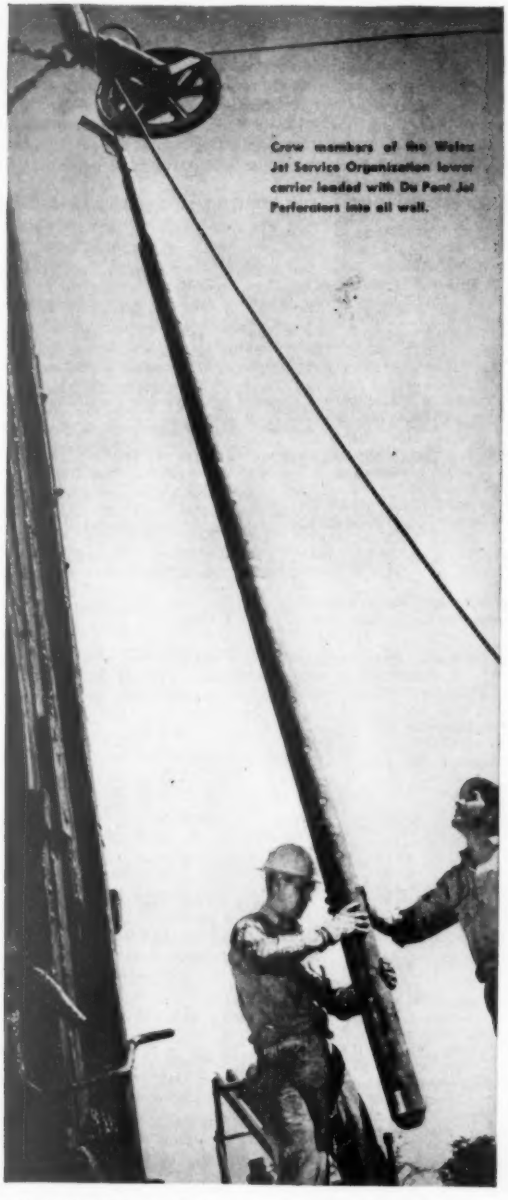

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solvents. Although a number of the solvents are among the highest-tonnage chemicals, the major portion of the production of these chemicals is utilized for other purposes. Requirements, therefore, will be estimated in discussions of major chemical requirements not included in other end product classifications.

The expected use of ethyl alcohol (the only important solvent on which data are available) as a solvent is projected only to 1962, when requirements are set at 71 millions of pounds.

Synthetic Rubber

Synthetic-rubber projections are discussed for GR-S, butyl, neoprene, nitrile-type rubber, and specialty rubbers. Because the chemical constitution of the "true" synthetic rubbers will doubtless be altered somewhat by 1975 to provide better products, only rough generalizations were made about chemical requirements. It was assumed that synthetics in 1975 would be derived principally from normal and isobutylene, acetylene, ethylene, and aromatics.

A total of 2 million long tons (4.48 billion pounds) of synthetic rubber is predicted for 1975. It was assumed that about 85 per cent of the requirements would be for normal or isobutylene, 10 per cent for acetylene or ethylene, and 5 per cent for aromatics. Quantitatively, in millions of pounds, the figures would be 4,231 for normal or isobutylene, 498 for acetylene and ethylene, and 249 for aromatics.

Aromatics requirements, principally benzene, for all synthetic rubbers would run to 319, 355, and 249 millions of pounds in 1955, 1960, and 1975, respectively. C_2 hydrocarbons would run to 193 (for ethylene) and 203 (acetylene) millions in 1955; to 299 (for ethylene) and 262 (acetylene) millions in 1960; and to 706 millions (for the C_2 group) in 1975. (In these estimates, ethylene and acetylene are alternative requirements in some cases.) The butylenes would run to 1,746 (normal) and 232 (iso-) in 1955; to 1,834 (normal) and 417 (iso-) in 1960; and to 4,234 (total) in 1975.

Synthetic Fibers

Synthetic-fiber production (exclusive of rayon) for 1960 is estimated at 975 million pounds. By 1975 the estimate rises to 4 billion pounds. The breakdown is as follows (in millions of pounds): polyamides (Nylon), 800; acrylonitrile and copolymers (Dynel), 1,200; polyesters (Dacron), 1,000; miscellaneous, 1,000.

The basic chemical requirements for these synthetic fibers (not including processing chemicals) were estimated in Table 4.

Rayon . . . Rayon production will rise to 3 billion pounds by 1975. The chemical requirements for rayon, assuming its production to be 70 per cent viscose and 30 per cent acetate, have been calculated in Table 5.

Other Chemical Requirements

Table 6 gives additional major chemical requirements for 1955, 1960, and 1975 not included in previous end-product classifications. These include additional requirements for methanol and formaldehyde, for methyl chloride, methylene dichloride, ammonia, acetylene, sulfur, ethylene glycol, ethanolamines, ethylene oxide, ethyl alcohol, ethyl chloride, ethylene dichloride, ethylene dibromide, and other ethylene requirements; for propylene, butylenes, higher olefins, benzene, toluene, xylenes, cresylic acids, and naphthenic acids.

Raw Material Requirements

Tables 7-11 include requirements for chemical conversion of all basic materials that can be derived from petroleum or natural gas by recovery or refining process. With only a few exceptions, which have been specified, these requirements are the quantities of basic materials which would be necessary to satisfy demands for all end

TABLE 4—CHEMICAL REQUIREMENTS FOR SYNTHETIC FIBERS (EXCLUDING RAYON)
(Millions of pounds)

Year	Ethylene (*)	Ethylene (†)	Acetylene‡	Acrylonitrile	Hydrogen cyanide	Ammonia	Benzene	p-Xylene	Methane
1950	21.5		20	9.4	5.3	26.6	147		3.5
1953	102	7	71	86	49	89	353	26.5	32
1960	285	30	248	288	163	183	441	114	108
1975	1,252	200	1,104	1,000	566	578	1,176	756	373

*Ethylene in this column is alternative with acetylene. †Ethylene in this column is not alternative with acetylene. ‡Acetylene is alternative with ethylene.

TABLE 5—CHEMICAL REQUIREMENTS FOR RAYON
(Millions of pounds)

Year	Carbon bisulfide	Sulfuric* acid	Acetic† anhydride	Acetic† acid	Acetone†	Sulfur	Methane
1953	404	1,616	912	1,596	91	963	94
1960	505	2,020	1,140	1,995	114	1,214	118
1975	798	3,198	1,800	3,150	180	1,901	187

*For both viscose and acetate rayon; calculated for 100 per cent sulfuric acid. †Ethylene, propylene, and other requirements for these products are included in other calculations.

TABLE 6—MAJOR CHEMICAL REQUIREMENTS NOT INCLUDED IN OTHER END-PRODUCT CLASSIFICATIONS
(Millions of pounds, unless otherwise indicated)

	1955	1960	1975
Formaldehyde (100 per cent basis)	675	810	1,290
Methanol	1,500	1,800	2,870
Methane	580	720	965
Methyl chloride*	55 (19)	80 (28)	120 (42)
Methylene dichloride*	60 (14)	75 (18)	120 (28)
Ammonia*	5,200 (4,100)	6,400 (5,000)	10,400 (8,100)
Acetylene	859	1,525	3,914
Sulfur	13,884	17,391	27,634
Ethylene glycol†	558 (457)	670 (549)	900 (737)
Ethylene polyglycols and ethers	61	67	87
Ethanolamines†	50 (42)	61 (51)	116 (97)
Ethylene oxides†	(46)	(61)	(123)
Ethyl alcohol (millions of gallons)†	285 (1,375)	390 (1,882)	700 (3,378)
Ethyl chloride†	(230)	(320)	(575)
Ethylene dichloride†	(81)	(111)	(195)
Ethylene dibromide†	(38)	(45)	(70)
Ethylene (miscellaneous purposes)	115	160	275
Propylene	1,115	1,460	2,545
Butylenes and isobutylene	204	223	466
Higher olefins	30	95	200
Benzene	1,152	1,452	2,660
Toluene (exclusive of military requirements)	495	635	1,060
Xylenes	400	550	900
Cresylic acids	90	115	175
Naphthenic acids	35	45	75

*Methane requirements in millions of pounds in parentheses. †Ethylene requirements in millions of pounds in parentheses.

products which can be derived therefrom. Inasmuch as some demands will be fulfilled from other sources, actual requirements for a number of the basic materials will be lower than those estimated herein.

The prediction of future requirements represents a summary of a number of factors. Known projected increases were given primary consideration. Growth in population was always considered, and finally, the estimates were revised in whatever direction seemed logical on the basis of quality and demand for known products. In some instances, demand will either level off or accelerate to a greater extent than was assumed in these estimates.

Gas-based materials . . . Table 7 includes estimates of basic materials derived from natural gas. Although large quantities of propane and butane are present in natural gas, they are used for much the same purposes as methane which is the major constituent. Since they are present in small percentages compared to methane, all requirements have been calculated on the basis of methane. Pentanes have been listed separately as they are used for different purposes.

The methane requirements under C and D are principally additional to that under A or B. The quantities in column C, which gives requirements of methane for ammonia, would, however, supply some material that could be used to replace quantities under A or B. For the purposes of simple comparison, B+C+D will be regarded as the maximum possible requirements of methane.

Thus a maximum production of 32 billion pounds of methane in 1955, 33.6 billion in 1960, and 30.8 billion in 1975 would be sufficient. From a comparison with availability from natural gas of 110 billion pounds in 1955, 121.8 billion in 1960, and 217.5 billion in 1975, it is evident that the raw material position in relation to methane-derived products is secure.

Availability of pentanes has not been calculated since they are utilized largely in gasolines. However, more than adequate quantities are available for the comparatively small requirements for chemical conversion.

Materials from cracking processes . . . Table 8 includes estimates of basic olefin materials. Ethylene, propylene, and butylenes are derived as byproducts from cracking of petroleum fractions and from special processes in which ethane, propane, butanes or mixtures thereof are cracked. The higher olefins such as the heptenes are derived from liquid fractions obtained by the cracking of petroleum.

Actual requirements will probably be greater than the quantities under B, but somewhat less than those under A. Assuming the maximum possible requirements given in column A, only 3.55 billion pounds would be required in 1955 compared to an availability of 24.3 billion pounds from cracked gases and the cracking of ethane. For 1960 a demand of 5.7 billion pounds is far less than availability of 26.9 billion pounds, and for 1975, a demand of 10.4 billion

TABLE 7—REQUIREMENTS FOR METHANE AND NATURAL GAS*
(Millions of pounds)

Year	Methane A	Methane B	Methane C	Methane D	Acetylene† E	Acetylene† F	Ammonia†	Pentanes
1955	2,019	2,413	4,830	24,800	1,046	1,481	5,200 (2.6×10^6 tons)	35
1960	3,104	3,806	5,968	23,850	1,846	2,629	6,400 (3.2×10^6 tons)	50
1975	6,628	8,427	9,452	12,950	4,764	6,748	10,400 (5.2×10^6 tons)	75

*Chemicals derived from propane or butane in natural gas, and hydrogen and carbon black derived from natural gas have been calculated as derivatives of methane. †These are not additional requirements. Basic source material is included under methane. A.—Requirements for all chemicals except ammonia, carbon black and that part of acetylene which may be used for chemicals derivable from ethylene. B.—Requirements for maximum usage of acetylene are included. C.—Requirements for ammonia only. These quantities are not entirely in addition to A or B. Some products in addition to hydrogen for ammonia can be produced from these quantities of methane. D.—Requirements for carbon black only. E.—Excludes acetylene requirements for chemicals which are also derivable from ethylene. F.—Includes acetylene requirements for chemicals which are also derivable from ethylene.

TABLE 8—REQUIREMENTS FOR OLEFINS
(Millions of pounds)

Year	Ethylene A	Ethylene B	Propylene	Butylene normal-	Butylene iso-	Higher olefins (heptenes, etc.)
1955	3,550	2,550	1,561	1,940	242	100
1960	5,200	3,700	2,043	2,040	434	190
1975	10,400	7,000	3,563	4,700		380

A.—Maximum requirements if ethylene were used as sole source material for its derivatives. B.—Excludes ethylene replaceable by acetylene and assumes 40 per cent ethyl alcohol production from other sources.

TABLE 9—REQUIREMENTS FOR AROMATIC HYDROCARBONS
(Millions of pounds)

Year	Benzene	Toluene*	Xylenes Ortho	Xylenes Para	Xylenes Others, including mixtures
1955	2,881	495	272	27	400
1960	3,630	635	349	114	550
1975	6,651	1,060	686	756	900

*Includes only solvents and chemicals exclusive of TNT.

TABLE 10—REQUIREMENTS FOR MISCELLANEOUS PETROLEUM MATERIALS
(Millions of pounds)

Year	Kerosine* fractions	Sulfur	Cresylic acids	Naphthenic acids	Liquid† petroleum
1955	33	14,929 (6.7 million long tons)	90	35	1,540
1960	40	18,700 (8.3 million long tons)	115	45	2,333
1975	68	29,714 (13.3 million long tons)	175	75	5,566

*Includes material for detergents only; calculated on the basis of tetradecane. †For carbon black only.

TABLE 11—CHEMICAL REQUIREMENTS FROM HYDROCARBON SOURCES

	1955	1960	1975
Natural gas—			
Chemical requirements (billion lb.)	32.866	34.654	32.454
Total natural gas:			
Billion lb.	460	570	900
Trillion cu. ft.	9.2	11.4	18
Per cent required for chemicals	7.14	6.08	3.61
Petroleum—			
Chemical requirements (billion lb.)	14.126	18.764	36.280
Total petroleum:			
Billion lb.	695	834	1,251
Billion bbl.	2.5	3	4.5
Per cent required for chemicals	2.03	2.25	2.90

compares favorably with availability of 34 billion pounds.

Actually much greater quantities of ethylene could be made available. The cracking of propane is one of the major sources, and availability of propane from cracked gases alone will be about 16 billion pounds in 1955 and 1960 and 12 billion in 1975.

Propylene requirements total 1.56 billion pounds in 1955 compared with availability of 28.6 billion pounds from cracked gases. Supplies continue to be more than adequate in 1960 when requirements are 2.04 billion pounds against availability of 32.1 billion pounds and in 1975 when requirements are 3.56 billion and availability 42.5 billion pounds.

The availability of butylenes is also far greater than requirements. A total of 30.7 billion pounds will be available as compared with requirements of 2.18 billion pounds in 1955, 36.2 billion compared with requirements of 2.47 billion in 1960, and 52.8 billion compared with requirements of 4.7 billion in 1975.

The availability of higher olefins from cracked petroleum fractions has not been estimated but is known to be almost unlimited compared to requirements.

Aromatics from hydrocarbons . . . Table 9 gives estimated requirements of benzene, toluene, and xylene for chemical conversion and for direct use as solvents. The naphthenes used for chemical conversion are consumed principally in the preparation of aromatics. Therefore, estimates of requirements will not be made. The benzene requirements, particularly for 1960 and 1975, have included a number of uses for which toluene or xylenes, and in some cases, aromatic mixtures, can be used. Toluene requirements do not include the large tonnages necessary for TNT.

The quantities of o-xylene have been estimated on the basis of all phthalic anhydride being derived therefrom. Actually, the principal phthalic production comes from naphthalene and will continue to be so produced for a number of years. Estimates of p-xylene are entirely for synthetic fibers. It is highly probable that m-xylene will also be used for this purpose and the 1975 estimate, at least, may be partially supplied by the meta isomer.

The "other xylene" column includes some quantities of ethylbenzene, which is obtained in mixtures of 8-carbon atom aromatics along with the xylenes. As soon as proper purification and separation procedures have been worked out, ethylbenzene will supplant some of the benzene and ethylene required for styrene.

Availability of aromatics from petroleum fractions is far in excess of requirements. Requirements of benzene are estimated at 2.88 billion pounds for 1955 compared with availability of 9.35 billion pounds, for 1960, 3.63 billion compared with 11.76 available, and for 1975, 6.65 billion compared with 18.95 available. Toluene requirements are only 495 million pounds in contrast to availability of 18.34 billion pounds in 1955, 635 million in contrast to availability of 22.98 billion in 1960, and 1.06 billion in contrast to availability of 36.9 billion pounds in 1975. Even greater amounts of xylenes are available. In 1955, a total of 23.47 billion pounds could be produced from petroleum, while requirements should not exceed 700 million. In 1960, requirements will be about 1.01 billion in contrast to 28.52 billion pounds available, and about 2.34 billion in contrast to 42.26 billion pounds in 1975.

Other hydrocarbon chemicals . . . Table 10 includes other basic chemical source materials from petroleum and natural gas. Higher paraffins are derived from a kerosine fraction of petroleum. The requirements herein are principally for detergents and are calculated on the basis of tetradecane as a representative compound. These estimates may be considered low (see Detergents). Although availability of this fraction has not been estimated in the foregoing text the large quantities of petroleum gives assurance that far more than adequate supplies are available.

The sulfur produced from petroleum and natural gas is derived principally from hydrogen sulfide present in natural and refinery gas. Quantities herein are for total United States requirements. It is not expected that the major sulfur requirements will be supplied from petroleum and natural gas because other large scale sources are cheaper. However, more than 4 per cent of the present total demand is being supplied from natural and cracked gases, and the amount can be increased up to approximately 10 per cent if necessary.

A total of 464 thousand long tons of sulfur could be derived from the present natural-gas and petroleum production, 780 thousand from projected 1955 production, 905 thousand from 1960 production, and 1.27 million from 1975 production.

Cresylic acids are recovered from heavy cracked petroleum distillates. No calculations of availability have been made. However, it is known that the cresylics could be produced in much greater quantities than at present if the price structure warranted construction of facilities. The projected requirements in Table 10 can be met very easily if additional facilities are installed.

Naphthenic acids are obtained directly from petroleum. No calculations of availability have been made in previous discussion. Although military requirements for flame throwers, jelly bombs, and mildewproofing agents may cause a temporary shortage, there are more than adequate quantities in petroleum to meet the requirements estimated in Table 10.

The percentages of the total natural gas and petroleum production which the requirements given in Tables 7-11 would utilize have been calculated. In making these calculations it has been assumed that all the methane and pentanes come from natural gas and that all the olefins, cyclic compounds and liquid hydrocarbon fractions come from petroleum. Sulfur has been assumed to come from both sources; the quantities of sulfur used in this calculation are availability figures, not requirements.

The results given in Table 11 show that the chemical requirements can be met through the allocation of small percentages of petroleum and natural gas to that purpose.

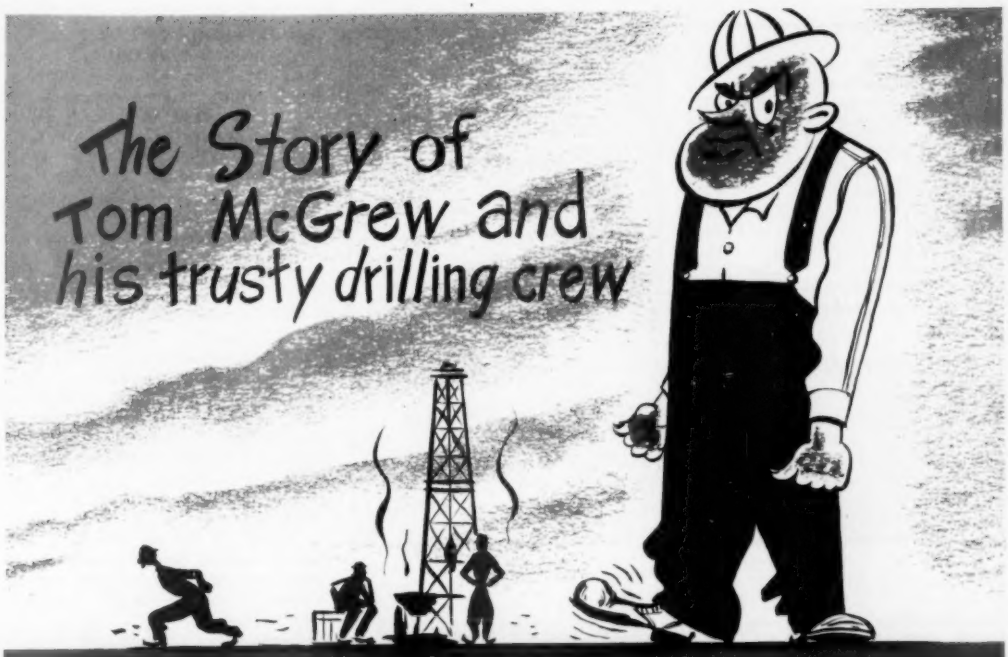
BOOKS

REVIEWS OF PETROLEUM TECHNOLOGY, VOLUME 11 (Covering 1949). Published by The Institute of Petroleum, 26 Portland Place, London, W. 1., England. 274 pp. 27s. 6d. post free.

As in previous years the authors have done much searching of literature to examine the material on which their reviews are based and the volume contains references to nearly 3,000 technical papers and articles. Although 1949 is the year mainly covered, there are instances where in previous years the information available has been insufficient to warrant a review covering 1 year only. Thus, the present volume reviews plant instrumentation for the period 1947 to 1949, crude oils for the same period, and insulating and hydraulic and bitumen for the years 1948 and 1949.

RADIOACTIVE ATOMS AND ISOTOPIC TRACERS. By Joseph W. Kennedy. Published by Pennsylvania State College, State College, Pa. 89 pp. $2.

This volume is a compilation of the Twenty-Sixth Annual Priestly Lectures, delivered by the author in April 1952. It is being made available by Phi Lambda Upsilon, honorary chemical society at Penn State, and by the department of chemistry at the same institution. The book is divided into five chapters, as follows: (1) Nuclear Transformations; (2) Uranium, Fission, and Transuranium Elements; (3) Isotopic Tracers and Electron Transfer Reactions; (4) Quantitative Kinetic Studies with Tracers, and (5) Self-Diffusion of Aqueous Ions."



This is the story of Tom McGrew—
a tool pusher and his trusty crew.
They were going great guns on McFudd No. 1
when the rig broke down and spoiled all the fun.
They worked and they sweat and they cursed the day
that had brought them this trouble and caused delay.
On into the night—it was really a chase
patching old parts to get started once more,
but each new effort ended in despair
and Tom finally admitted, "It's beyond repair."
It would look pretty bad on the drilling report
for a crew with such talent to be caught so short.

The gloom of the night showed up in each eye,
Until George Tool, our driller, yelled U. Ned Supply!
"You're right, said Tom, his face shining bright
they'll get us the parts and relieve our plight.
Soon a truck was speeding to McFudd No. 1
With everything needed to get the job done.
So the moral of our story is plain to see
that from United you get Service and Dependability.
And whenever you're needing supplies in a hurry
just call United and then don't worry.
You'll get them real quick, and that is why
You can always rely on United Supply!

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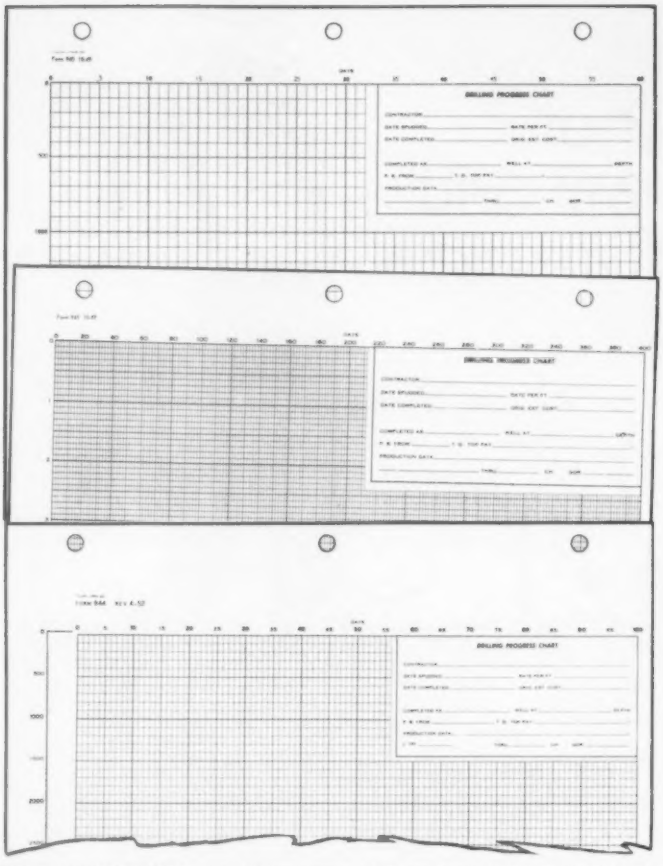


DEPTH CLASSIFICATIONS of drilling process charts employed by Stanolind Oil & Gas Co. comprise 0-6,000 ft., 0-10,000 ft., and 0-15,000 ft.

Penetration Curves Standardized

Major oil company uses three principal charts arranged in three depth classes.

Joseph A. Kornfeld

CLOSE operating control on drilling processes is reflected in the standard procedure employed by oil companies as a part of current operations. Stanolind Oil & Gas Co., which has 600 wells or more per year drilled, employs a full-time employe who prepares, and keeps up-to-date drilling progress on every well.

Graphic Technique

Conventional penetration curves of depth versus days are plotted on cross-section paper such as is shown in an accompanying illustration. Due to the wide diversity in producing depth ranges of this company's operations, it was found that the curves could be arranged in three depth groupings as follows:

0 to 6,000 ft. (This takes care of most shallow drilling in the Illinois basin and the Mid-Continent.)

0 to 10,000 ft. (This classification accommodates much of the intermediate depth of drilling in many parts of West Texas, North Louisiana, East Texas, and some Rocky Mountain fields.)

0 to 15,000 ft. (Deep Gulf Coast wells are plotted on this sheet.)

Each chart is standardized and large quantities are printed at one time. The charts measure 11 by 17 in. and are punched for insertion in a large three-ring binder. For quick reference, the following headings appear at the base of each chart so that daily entries can be made on the curves as follows: State, Area, Field, and Well. When placed in the binder, the charts are arranged by leases, by fields, then by operating areas and by states. In this way no difficulty should be experienced in finding a chart.

Well summary . . . As shown on the illustration, each chart carries a summary of the well in the upper right-hand corner. This contains the following information: Contractor, Date Spudded, Rate per Foot, Date Completed, Original Estimated Cost. Moreover, it carries well completion data such as: Completed as . . . . . Well at . . . . . depth.

Both the plug-back depth and total depth are carried on the chart, as well as the top of the pay formation. Initial production data are summarized, which includes: Oil Rate, Corrected Oil Gravity, Choke Size, and Produced Gas-Oil Ratio.

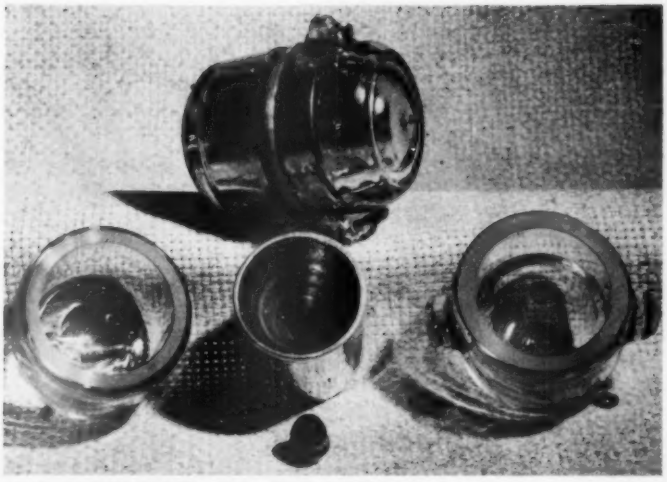
Plotting procedure . . . From the daily drilling report the drilling progress of each well is plotted as a solid line. Moreover, significant factual data are penciled in on the curve which include the following type of information: Casing Setting and Cementing, Drill-Stem Tests, Lost Circulation, Fishing Jobs, Waiting-on-Cement Time, Diamond Coring, Electric-Logging Surveys, Gun-Perforating Intervals, and the like. In fact, nearly every drilling process is included on each curve.

Applications

Utility of this standard procedure of maintaining complete drilling process curve on each well lies in the following:

1. Evaluation of day work operations in a given area.
2. Evaluation of casing program.
3. Evaluation of coring time on developmental wells.
4. Evaluation of coring program for difficult penetration jobs.

Superimposition of one curve over another to compare drilling processes in a developmental area are made possible through the use of standardized forms for a given depth classification. The over-all analysis of these curves contain a tremendous amount of information of direct value to the drilling engineer, the drilling superintendent, and to the contracting-drilling department. Important savings can be obtained through analyses of conditions of offset wells.



GLASS GUN CHARGE consists of a copper-lined shaped explosive charge and booster pellet, enclosed in a pressure resistant, protective glass case. Fig. 1.

WELL COMPLETIONS . . .

. . . Jet Perforating With Glass Gun

by W. M. Russell*

PRINCIPLE OF SHAPED-CHARGE SHOOTING . . . This was developed during World War II. By forming a cone-shaped depression into a block of high explosive, a large amount of the energy of detonation is concentrated into a pencil-like jet of gas, of incredibly high velocity (approximately 20,000 m.p.h.). The jet is powerful enough to penetrate many inches of steel, leaving a clean opening. Adapting such shaped charges to oil-well uses, these explosive jets not only perforate several strings of casing and cement, but penetrate into the formation beyond, providing unimpeded drainage channels to the well bore.

THE glass gun consists of an assembly of individually glass-enclosed, explosive shaped charges. These consist of two hemispheres of high-quality glass, a pressed charge of powerful RDX explosive containing a copper-lined cavity, and a small booster pellet. The components are assembled and the glass case is sealed with a special sealing compound. The completed charge assembly is capable of withstanding 10,000 psi. without collapsing or leaking.

The glass-enclosed charges then are assembled in an expendable aluminum carrier. This carrier consists of a shooting head, ⅞-in. aluminum tubing and small cast aluminum brackets to hold the tubing in tripod form. The charges are spaced in any desired shooting pattern and are held securely in place by thin steel bands.

*Dowell Incorporated, Tulsa.

Detonation . . . The charges are shot by means of a detonating string explosive, known as Primacord, contained in each of the aluminum-frame tubes. An electrical impulse, originating in the control truck at the surface, is transmitted through the suspending cable and detonates a blasting cap in the shooting head of the gun assembly. This detonates the Primacord which, in turn, detonates the individual shaped charges, forming the penetrating jets required for perforation. The glass containers and the aluminum tubing are disintegrated, leaving only minute particles of glass and metal in the well.

At present, there are three principal sizes of shaped charges used in the glass gun. These are designated as the GG2, GG4, and GG7 charges, and each has specific well applications. Table 1 shows the principal uses of these charges, together with experimentally obtained performance data. These tests were conducted under simulated well conditions.

Casing Tests

Glass charges, selected at random, were fired into specially prepared targets, consisting of N-80 casing, cemented with neat cement in a simulated sand formation (consisting of two parts sand and one part cement). All targets were allowed to age exactly 5 weeks before the perforating tests were made.

The GG2 charges penetrated 5½-in o.d. casing, 1 in. of neat cement, and approximately 14 additional inches into the formation. The GG4 charges penetrated 5½-in. o.d. casing or 7-in. o.d. casing, 1 in. of neat cement, and approximately 15 in. into the formation beyond.

In a special series of tests, designed to simulate a well condition where there are two casing strings to be perforated, the targets consisted of 5-in. o.d. casing cemented in 7-in. o.d. casing. These, in turn, were cemented in the simulated sand formation. The GG2 charges used in these tests penetrated the two casing strings and approximately 11½ additional inches into the formation.

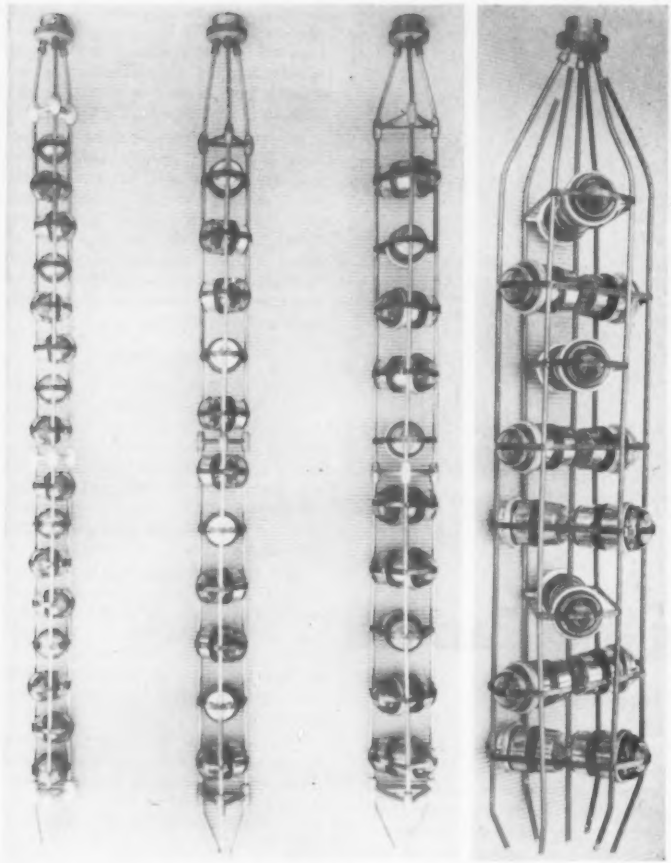
The value of the increased penetration of the formation obtained through use of the glass gun is apparent when the drainage areas formed by the jet blasts are compared with those obtained from the older-style steel gun.

For example, in perforating 5 in. o.d. casing, the steel gun produces a ¼-in. jet hole approximately 6½ in. in length, into the formation. This pro-

TABLE 1—APPLICATION AND PERFORMANCE DATA

Type charge	Gun diameter	Application	Perforation diameter (in.)	Penetration into formation (in.)	Drainage area of jet hole (sq. in.)
GG2	3⅜ and 4⅞	In 4-in. o.d. casing or larger	½	14	16.5
GG4	4½ and 4⅞	In 5½-in. o.d. casing or larger	¾	15	26.4
GG4	4½ and 4⅞	In open-hole shooting below 5½-in. o.d. casing	(*)	16	(*)
GG7	5½	In open-hole shooting below 7-in. o.d. casing	(*)	18	(*)

*The perforation diameter and lateral drainage area in open-hole shooting is variable, depending upon the nature of the formation which, in turn, determines the extent of shattering.



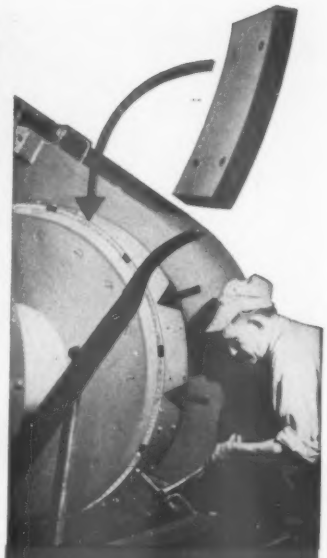
THREE DIFFERENT SIZES, left, Fig. 2, of glass-gun charges permit gun construction to meet specific well diameters as small as 4 in. Special design guns, right, Fig. 3, can be assembled for use in wells with greater than 7-in. o.d. casing, up to diameters of 3 ft. or more.

duces approximately 5½ sq. in. of lateral drainage area. Under similar conditions, the glass gun produces a ½-in. jet hole approximately 14 in. in length, creating approximately 16½ sq. in. of lateral drainage area. This is an increase of about 200 per cent in drainage area over that created by the steel gun.

In 7-in. o.d. casing, the steel gun produces a jet hole ½ in. in diameter and 7½ in. in length, for a lateral drainage area of 7.1 sq. in. The glass gun, under similar conditions, produces a ¾-in. jet hole approximately 15 in. in length, creating approximately 26½ sq. in. of lateral drainage area. This is an increase in drainage area of around 250 per cent over that created by the steel gun.

Additional tests were conducted, firing glass-gun charges directly into the simulated sand formation in order to observe the effective penetration during open-hole shooting. In these tests, the GG4 charges penetrated approximately 16 in. into the formation, while the GG7 charges penetrated from 18 to 20 in. into the formation.

The large explosive charges used in the glass gun are particularly valuable in open-hole shooting since they provide shattering action, along with the jet penetration. Caliper surveys made in open hole, before and after jet perforating with the glass gun, show considerable hole enlargement in the jet-perforated areas. This application of jet shooting is particularly attractive since the entire force of the explosive can be directed into a specific desired zone. In addition, the need for gravel packing is eliminated and the danger of damage to the casing avoided. Clean-out time is reduced because of the self-destroying feature of the glass gun.



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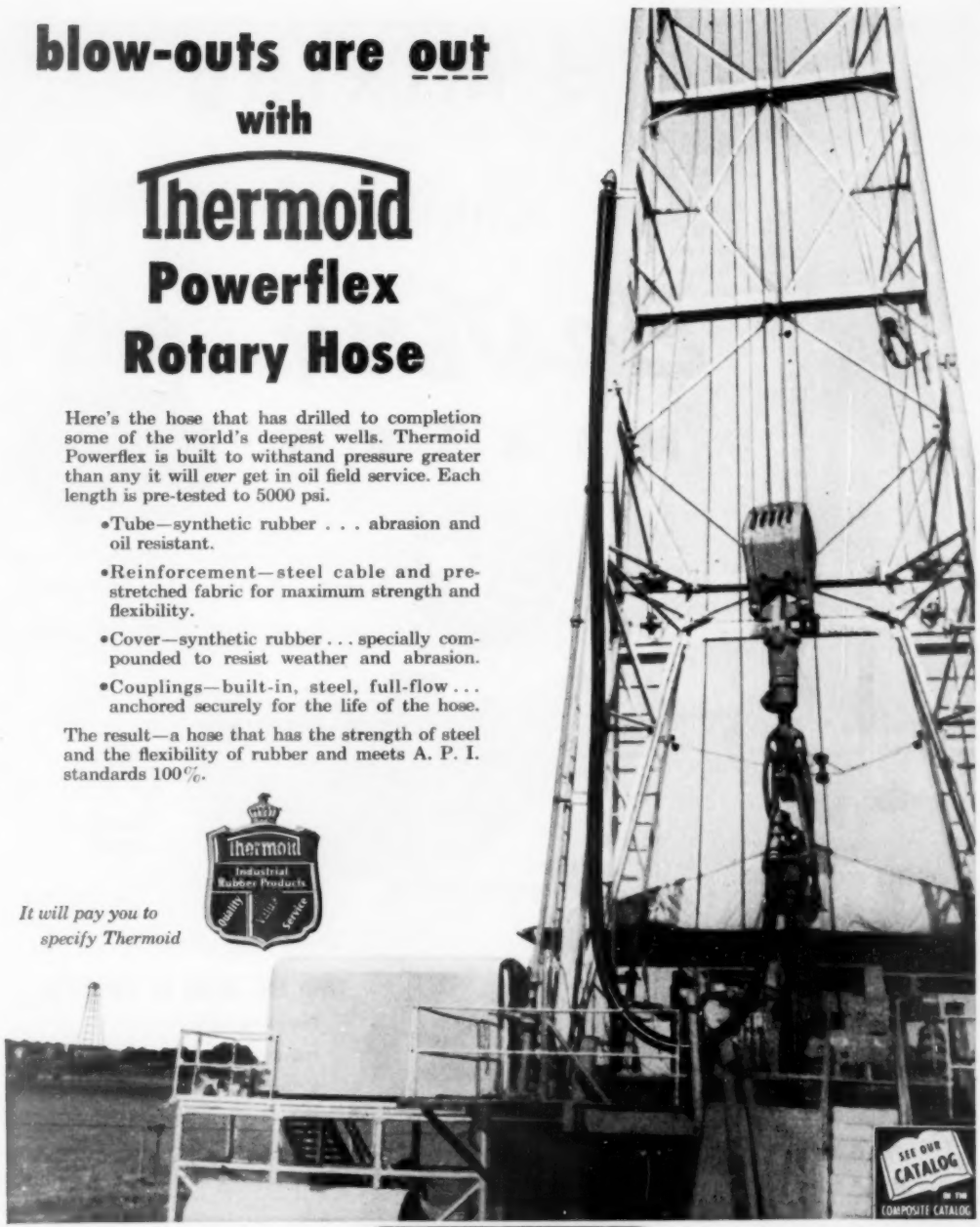

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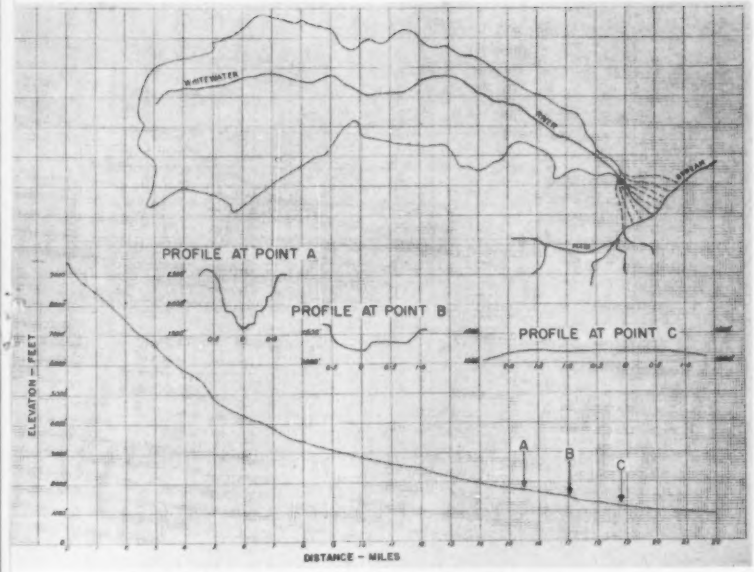


WHITEWATER RIVER WATERSHED, longitudinal and transverse profiles, Fig. 1.

FLOOD CHARACTERISTICS OF ALLUVIAL STREAMS . . .

Avoid Crossing Failures by Balanced Pipe-Line Design

Careful analysis of the stream profiles should be made in the neighborhood of the crossing point

by Robert T. Knapp*

THE major characteristics of alluvial streams should be well understood by pipe-line designers so that they can avoid difficulties arising from inadequate design. The author discussed briefly some of the chief characteristics of streams and covered in more detail the hydrodynamic forces and resulting pipe-line stresses pertinent to pipe-line crossing design in a paper entitled, "Pipe-Line Stream Crossings."[1]

Balanced Pipe-Line Design

The term "balanced pipe-line design" is used to refer only to the flood-protection phase of pipe-line construction and operation. Because a pipe line operates as an integrated unit, the penalties exacted for lack of balance in transporting capacity between different sections of the same pipe line are immediate and drastic. However, the effectiveness of the flood protection of a pipe line is never tested simultaneously at all critical points. Consequently, it is more difficult to obtain a quantitative evaluation of the adequacy of the flood protection of the entire line.

For this reason, the subject of balanced pipe-line protection warrants more attention.

Few, if any, pipe lines afford a construction that would eliminate all possibility of flood damage. Furthermore, such a condition would not be economically justifiable. In this connection there are two separate phases which need consideration:

1. The level of protection required for the individual pipe line under consideration.

2. The design required at each danger point to provide this minimum level of protection.

Required Level of Protection

The most significant factors in the determination of the level of protection justified for a given pipe line are (1) the importance of the pipe line as a supply source relative to the company's over-all system, and (2) the effect of down time in the event of failure. A higher level of protection is required for the sole source of supply than for one of a series of parallel feeders.

Generally speaking, a monetary value can be assigned to down time. Normally there is a period of down time during which local adjustments can be made without any appreciable loss of revenue. However, if the repairs are not completed within these allowable time limits, then very serious and expensive outages may result. Balanced design requires that the cost of this down time plus the cost of repairs be weighed against the initial cost of protection.

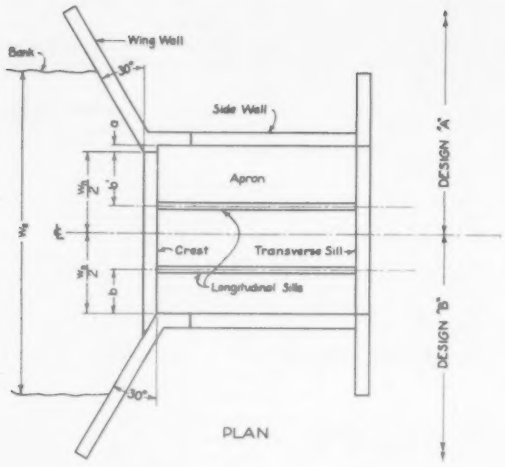
In the majority of cases the differences between the cost of down time during the initial "permissible" period and thereafter is so great that it leads to the conclusion that all points of possible failure which cannot be repaired within this permissible time limit must be designed to withstand the most extreme flood conditions likely to occur. Fortunately, this is not as serious a problem as might be supposed. In the first place, it will be found that in the majority of danger points the difference in construction cost between good protection and poor protection is very small. In the second place, it is possible to estimate with reasonable certainty the characteristics of the most severe flood conditions that are likely to be encountered at the specific locations.

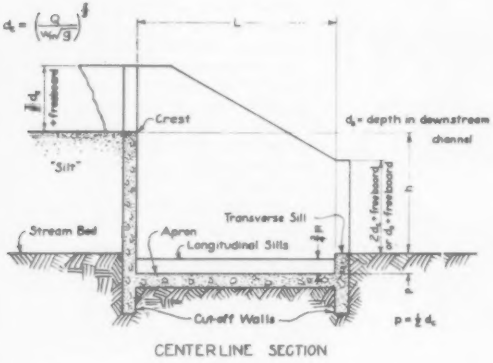
Relative Costs of Protection

Two of the most effective ways of increasing the protection of a given pipe-line at a submerged stream crossing are to provide an adequate depth of cover and to employ a pipe line of sufficient specific weight. Tables 1 and 2 show some representative costs for variations in these two variables.

Weight of pipe . . . In general the difference in cost between normal-weight and heavy-wall pipe is a surprisingly small fraction of the total cost of the crossing, particularly when con-

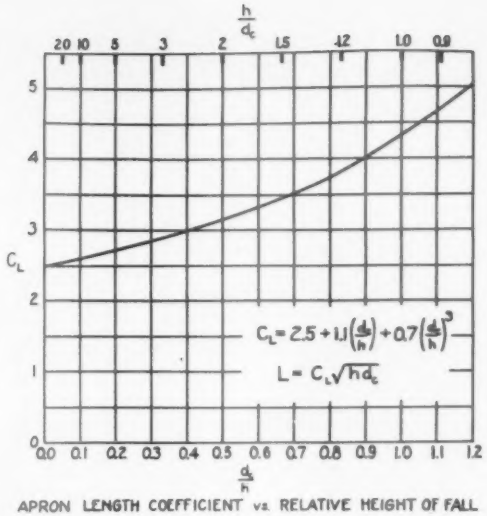
*Professor of hydraulic engineering, California Institute of Technology, Pasadena. Presented at Pacific Coast Gas Association Technical Section Transmission Conference, Berkeley, Calif., 1952.

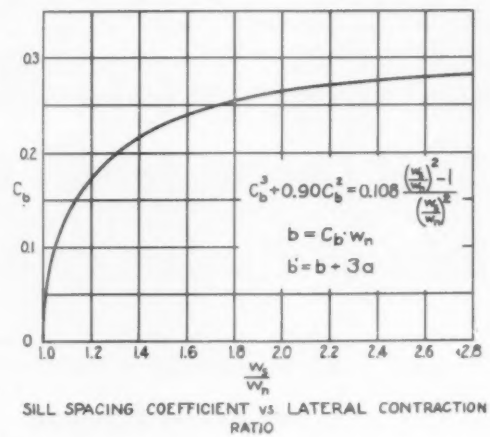




GULLY-CONTROL DROP STRUCTURE

Design 'A' provides nappe ventilation through offset of the side walls from the notch edge as well as through lateral contraction of the flow at the crest. Design 'B' provides nappe ventilation through flow contraction alone.





DROP STRUCTURE DESIGN for pipe-line crossings of alluvial streams, Fig. 2.

TABLE 1—TYPICAL INSTALLATION COSTS VERSUS PIPE-WALL THICKNESS

Pipe Size (In.)	Wall (In.)	Wt./Ft.	Specific Weight	Installation Cost/Ft.*
16	¾	122	87.5	$22
16	½	83	59.4	$16
16	⅜	63	45.2	$14

* Assumes 10 ft. cover in caving sand. Includes overhead costs.

TABLE 2—TYPICAL INSTALLATION VERSUS DEPTH OF COVER*

Depth (Ft.)	Vertical Face Trench	Caving Sand and Gravel 1 to 1½ Slope
5	$18.90	$19.50
10	$19.40	$22.00
15	$20.25	$25.70
20	$21.00	$30.50

*Assumes ¾-in. wall 16-in. o.d. in dry stream bed. Includes overhead costs.

sideration is given to the effectiveness of this additional weight in increasing the degree of protection. The cost of increased cover is dependent upon the type of material through which the pipe line passes. If the material will stand with a vertical face when the trench is opened, then the yardage to be handled will vary linearly with the depth of cover. On the other hand, if the material has a relatively small angle of repose, the yardage will vary as the square of the depth of cover. Unfortunately, the trenches required for most stream crossings fall in the latter category.

The maximum flood hazard can be divided into two steps, the estimate of the maximum probable flow to be guarded against, and the evaluation during such a flood of the stream characteristics at the specific crossing.

Design Flood

In designing important stream crossings, the use of the data based on the 100-year flood has been considered conservative practice. However, the use of such a basis should be the considered policy of a company rather than a blind following of an engineering practice established for a completely different objective. In this connection it must be realized that in most parts of the world and certainly in this country, any estimates of the probably intensity of a 50 or 100-year flood must be considered to be very rough.

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Stream runoff records not always reliable for determination of flood potentials.

vations over many hundred years would be required to establish with any accuracy the probable magnitude of such floods. In the second place, the prediction of such figures from past observations always assumes that conditions will remain unchanged. This is a questionable assumption in an area in which large changes are being made in the cultural use of extensive blocks of land.

The words "100-year flood" imply only that for a given year the chances of a flood of that magnitude are 1 in 100. This applies to each year independently. The fact that in a given year a flood of that intensity has occurred does not imply that another one will not occur for a hundred years. In fact, the only really safe prediction is that at the end of one rainy season it is pretty sure that a 100-year flood will not occur before the next year.

Flood potentials . . . In the assumption of flood potentials of a given stream, too much confidence should not be placed in runoff records for that stream alone even though they may be available for a long period of time. It is much safer to consider the rainfall and runoff characteristics of the entire area of which this particular watershed is a part, and to modify the predictions from the specific records in accordance with these regional characteristics. When such an evaluation is being made as an element in the design of a major pipe line meteorologists familiar with the particular areas should be consulted.

In many cases, only rainfall figures will be available for a given area. Furthermore, meteorological conclusions will usually be expressed in terms of the probable rainfall. Thus it is often necessary to predict probable flood flows from probable rainfall figures.

Pertinent Stream Characteristics

It is not enough to have a reliable figure for the maximum flood against which protection must be provided. It is also necessary to consider the pertinent stream characteristics at the point selected for the crossing. In fact, in many cases the selection of the point for the crossing may well be affected by the stream characteristics.

There are two different methods of securing adequate protection for a submerged pipe line. The first and simplest is to install the pipe line in such a fashion that it will never be acted upon by the flow. Such crossing is one in which an impermeable clay layer is available in which the pipe line may be imbedded. The trench backfill should be as resistant to erosion as was the original bed. In such cases the minimum acceptable amount of cover will be determined by how well this condition is fulfilled.

Unfortunately, this type of crossing is a rare exception rather than the rule. Hence, in the majority of cases, a method of securing adequate protection must be relied upon. This is the provision of adequate strength in the crossing itself to resist the hydrodynamic forces which may be encountered. Here the critical step is to determine the system of forces that the pipe line must be designed to resist.

Characteristics of Alluvial Streams

An alluvial stream must be considered to be a mixture of solid material and water which is in dynamic equilibrium. Solid material may be thought of as present in the form of bed load which is rolled or bounced along the bottom, and suspended load which is found in the body of the flow. Although there is no sharp dividing line between the two, it may be helpful to consider that in general the effective weight (that is, the total weight minus the buoyancy) of an element of bed load is carried directly by the bottom; whereas the effective weight of an element of suspended load is carried by the water itself and is finally transmitted to the bottom through an increase in the hydrostatic pressure.

During floods the suspended load may produce a very significant increase in the effective specific gravity of the flowing fluid, which in turn increases all hydrodynamic forces acting on the pipe line.

Whitewater River characteristics . . . In order to discuss some of the other characteristics of sediment-carrying streams, a specific case encountered in a major pipe-line crossing is considered. Fig. 1 shows the general characteristics of the Whitewater River, both in plan and elevation, together with three channel sections. In many ways this is typical of all streams. In its headwaters it has a steep gradient but relatively little flow. As the stream descends the watershed, the slope decreases rapidly, but the relative volume increases.

For most of its life, it is constrained to flow in a relatively narrow channel since the cross slopes are quite high. However, when it finally reaches the canyon mouth it discharges into the main river valley in a region of comparatively low cross slope, which thus removes the restrictions to its lateral spreading. Undoubtedly, the Whitewater would be classified as a "young" stream, that is, it is not in equilibrium as yet, but in general is eroding and thus continuously flattening the grade.

However, such general characteristics are not sufficient to determine what is liable to happen at a given section. Consider, for example, the Sections A, B, and C which on the profile are seen to lie relatively close together near the mouth.

Section A shows a well-entrenched channel. It is very improbable that the stream will change its course appreciably in this locality. Likewise, no radical changes of load will be expected in this section; although there might be some deposition during the periods of low flow and relatively heavy scour in major floods. Unit forces might be severe, but the problem would be specific and the length of line requiring protection would be relatively short.

At Section B it would seem that conditions are quite different. Here the width available to the stream is much greater than that normally required for any reasonable flood; hence, it might be anticipated that the thread of the channel would shift from side to side as the result of slight changes in the character of the debris load brought into this section from above. Probably it would be more difficult to design a satisfactory stream crossing at this section than at Section A. The length of crossing that would require protection would be much greater; on the other hand, there is no reason to assume that the unit forces would be decreased appreciably.

Section C is on the fan below the mouth. Here the river bed is higher than the surrounding country, which means that there is a strong tendency for the flow to spread and split into numerous small channels. An inspection of the site shows immediately that this is a large debris cone in which material is constantly being deposited. It is conceivable that the vagaries of a particular flood will scour a new channel from time to time, but the evidence indicates that these channels will be narrow and probably not very deep.

Although at first glance this appears to be a very disturbed area, it is actually a fine site for a stream crossing. The covering materials are not as permanently fixed as they are in the case of bedrock or a stratum of clay, however, they will furnish effectively the same high degree of protection because all of the conditions tend to increase the amount of deposit rather than decrease it, and it is difficult to imagine any changes in the natural conditions that will alter this statement.

In this region, therefore, it would appear that an excellent crossing would

"Four types of site encountered in stream crossing design."

be obtained with a moderate amount of cover and a pipe that is strong enough to span a relatively narrow channel in case one were eroded at any point along the crossing.

Four general types of site may be encountered in stream crossing design.

1. Cutting type . . . The distinguishing characteristics of this type is that the stream is actively cutting or degrading so that whatever the initial protective cover of a buried pipe line, it will continue to grow less. Such locations are usually found in the headwaters of streams, but may occur for short stretches at practically any point along the length in case some natural or artificial change alters the established regimen of the flow.

2. Equilibrium type . . . These locations are characterized by the fact that the stream has established what appears to be an equilibrium; that is, on the average it is neither aggrading nor degrading. For these locations a crossing design that is satisfactory at the present time should remain so permanently. In an alluvial stream this does not mean, however, that there will be no scour during the rising stage of floods nor deposition during falling stages.

3. Filling type . . . At such locations the stream is aggrading, the depth of fill is increasing; hence, once a satisfactory crossing is installed, conditions should grow increasingly favorable with time. As in Type 2, scour and deposition may accompany rising and falling stages of floods.

4. Control type . . . This is a typical situation caused by the exposure of an unerodible natural bed. Pipe-line crossings made at such points enjoy uniform protection during all stages of flow.

It is apparent that Type 1 sites should always be looked upon with suspicion; Type 4 should be accepted with rejoicing; Type 3 should never be discarded without careful examination.

Turbulent Flow

Although Types 1, 2, and 3 sites vary in their general desirability, they have the common problem that the bed in which the pipe-line crossing must be buried is not fixed and that it may scour enough during the rising stages of a flood to expose the pipe line to the flow. Since no two crossings are exactly alike, it is very useful for the crossing designer to have a general understanding of the mechanics of sediment-carrying streams so as to be able to deal with the conditions he encounters.

The sand grain which weighs about two and one-half times as much as the water it displaces is kept in suspension by the general turbulence or mixing activity of the flowing water and not by the average downstream velocity.

This random turbulent motion is a very complicated process. The degree of turbulence is determined by the level of agitation which is required to maintain the equilibrium between the rate at which energy is fed into the turbulent motion and the rate at which energy is abstracted from it.

If the stream falls over a low drop a large amount of energy is added to the turbulent system in a very short distance; consequently, the velocity of the turbulent fluctuations will show a corresponding increase. These conditions need not affect the entire cross-section. They may be much more local; for example, a bridge pier in a stream bed will introduce a disturbance into the flow that effectively feeds energy into the turbulent motion of the water in that part of the stream.

The degree of turbulence in a flowing stream is continually changing and must be thought of as a condition of dynamic equilibrium.

Mechanics of Suspension

If the vertical component of the turbulent fluctuation is greater than the settling velocity of the sand grain, the grain can be moved upward in the flow. Thus the turbulence makes it possible for the flow to transport the heavy grain in suspension. However, the grain is continually falling with respect to the water immediately adjacent to it and therefore is dissipating energy through viscous friction. Thus the suspended load of a flow is continually removing energy from the vertical component of the turbulent fluctuations.

A given sized sand grain requires that the vertical component of the turbulent velocity be above a certain minimum in order that the grain may remain in statistical suspension. This implies that a stream flowing under a given set of conditions will be able to transport in suspension only a certain amount of a particular size of sand. If more of this material is added it will be deposited. Material may be deposited in a quiet eddy that is easily transported in the main part of the flow.

Under equilibrium conditions much material in the bed will be about the same size as that being carried in suspension. If the turbulence level increases, the carrying capacity of the stream will be increased with the result that material will be picked up from the bed. The same line of reasoning indicates that obstructions to the flow, as for example the bridge pier, will produce local increases in transporting capacity which will result in scour around the obstacle. Complete obstructions, such as check dams, cause the water to spread out and "pond," thus decreasing the turbulence level and forcing deposition of large quantities of suspended material.

Numerous other examples of the workings of this dynamic equilibrium between the transported material and the flow will become obvious if the various conditions encountered in the stream are analyzed from this point of view.

Bottom Scour and Side Scour

Bottom and side scour are often considered to be quite different phenomena. The truth of the matter is that they have many things in common that their one essential difference tends to obscure. The tendency for a flowing stream to scour material either from the bottom or from the side is the same provided that the velocity adjacent to the surface under question is the same. The big difference is only what happens to the material that is removed if there is scour. Bottom scour may be thought of as a statistically reversible process. That is, material removed by bottom scour during a rising flood is usually replaced by an equal amount of similar material during the falling stage.

However, material once removed by side scour is permanently removed, simply because gravity does not act horizontally. All factors that tend to increase the velocity of the flow adjacent to the surface will increase either type of scour. Here again, this applies to local conditions as well as average conditions for the entire stream. For example, an obstruction in the stream may have the over-all effect of reducing the average velocity, but at the same time it may increase the local velocity at one particular point and induce very severe scour.

Some of the more obvious general factors that tend to increase scour are: confinement of the channel so that it becomes narrow and deep, increase of grade, sudden drop, and change of direction.

Resistance to scour . . . Except for very small particles, such as fine silts and clays, the resistance to bottom scour increases with the size. This is due largely to the frictional resistance to motion induced by the weight. This is not necessarily the case for side scour. Here the controlling factors may be the wedging action between particles, and the degree of compaction.

On the other hand, well-compacted clays are very resistant to erosion. Although there is probably some cementing action, it is possible that one

"Use of drop structure — satisfactory way of controlling bottom scour."

of the major factors responsible for this high resistance is the very small size of the interstices, which results in a great increase in resistance to the flow of water behind a particle which is necessary to permit its removal.

Stream Control

The general subject of stream control is far beyond the scope of this paper. Therefore, the few comments that follow refer only to the kind of local control measures that may be used to increase the safety of a submerged pipe-line crossing. These comments are general in nature and are not intended to be used as standard solutions for specific conditions.

One general rule can be stated at the very beginning: Do not employ temporary stream-control measures to protect a permanent pipe line. Inadequate control is expensive control. The stretch of stream that must be controlled is very short. This consideration, added to the fact that the pipe-line stream crossing represents a considerable financial investment and that service interruptions are very expensive, leads to the conclusion that only conservative and proven methods of stream control should be used.

Experimentation with new type control methods for the purpose of minimizing first cost should be left to others who have less at stake in case of failure.

Scour conditions . . . In the analysis of a given pipe-line crossing to determine whether or not stream control measures are necessary to secure the desired degree of safety, two different aspects of the crossing should be scrutinized:

1. Do the approaches need protection from possible side scour?

2. Can the pipe be installed below the depth of maximum scour, and if not, will it be more economical to design a crossing that will resist the flood forces even though exposed, or will it be cheaper to employ measures to limit the bottom scour so that the pipe will not be uncovered.

If it is found necessary to control the side scour, the construction employed must not only be able to resist the side scour action, but it must also be so designed that it is impossible for the stream to circumvent the control by going around the upstream end. Furthermore, the control structure must be so thoroughly anchored that it will not be destroyed by bottom scour.

In considering the depth to which it is necessary to carry a revetment intended to prevent side scour, it is usually not sufficient to design on the basis of maximum depth of bottom scour to be expected in the undisturbed stream.

There are several methods of controlling bottom scour. For example, the bottom may be paved over the buried pipe line. This proves to be a rather difficult job in an alluvial stream because the beginning and end of the pavement are particularly vulnerable to erosive forces. Also serious uplift forces are often found to exist which may displace the pavement.

Use of drop structure . . . One of the most satisfactory ways of controlling bottom scour and of eliminating hydrodynamic forces on the pipe is to install a drop structure downstream from the crossing. In effect, this is the creation of an artificial control point, and the crossing which has this type of protection is as satisfactory as one installed at a natural control point provided that the drop structure design is adequate. A standard design of a simple drop structure which is satisfactory for smaller streams was developed at the California Institute of Technology for the Soil Conservation Service. This design is shown in Fig. 2.

In the use of this design, no deviations should be tolerated in the construction of the stilling pool below the drop since the length, sill height, and similar features are all interrelated and act together to prevent serious downstream erosion. The use of this or similar proven drop structure designs removes considerable worry from the shoulders of the pipe-line-crossing designer. However, he must see to it that the wing walls and keys are adequate to prevent any possibility of the stream cutting a channel around the structure.

Other causes of scour . . . In the discussion of control measures in the prevention of side scour, it was mentioned that the presence of the protective construction itself would tend to increase the local bottom scour. The same concept is equally applicable to the pipe line. For example, if bottom scour is sufficient to remove all cover down to the top of the pipe line, it is very probable that the scour will then continue until the pipe line is completely exposed because of the additional disturbance introduced by the pipe line itself.

If concrete blocks are used to increase the weight of a pipe line, they also tend to increase the scour if they are exposed. If pile anchors are used, they, too, will increase scour when they become exposed. For this reason, they should not be permitted to extend above the top of the pipe line that they are supporting.

High specific weight . . . Considerable emphasis should be placed on the desirability of using a pipe line whose specific weight is appreciably greater than the effective specific weight of the mixture of sediment and water in the bottom of the stream. The necessary weight may be secured in a number of different ways. The simplest and most satisfactory is, of course, the use of heavy-wall piping.

All other methods of increasing the weight of the pipe tend to decrease its effective strength, both by increasing its inertia in case the stream forces are sufficient to cause sudden movement, and by increasing the cross-sectional area, which produces an increase in the hydrodynamic forces. Since the effectiveness of external weights is measured by the difference between their specific gravity and that of the mixture of water and suspended material, dense materials are at a premium.

The use of Barite aggregate in the construction of concrete weights is one example of this approach. In the evaluation of the comparative costs of heavy-walled pipe vs. external weights as a means of obtaining the required density, the added insurance against failure offered by the increased physical strength of the heavy walled pipe should not be ignored.

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BOOKS

TECHNIQUES OF PLANT MAINTENANCE, 1952. Published by Clapp & Poliak, Inc., 341 Madison Avenue, New York. 182 pp.

This book is a complete transcript of formal papers delivered at the third plant-maintenance conference held in Philadelphia concurrently with the third maintenance show. It includes also the questions put to speakers and answered by them on the platform, as well as their answers to questions that the conference time schedule did not permit them to deal with.

Wet Sandblasting

(Continued from page 88)

By means of a switch on the movable control box, the operator can rotate the bundle to any desired position. The car also has a turntable mounted slightly below the level of the rollers. This table is used when pumps and other items are being cleaned and is moved by the same drive that moves the rollers.

Effectiveness of Cleaning

Since tube-bundle cleaning is the major function of the high-pressure wet-sandblasting unit, an analysis of its effectiveness in this work has been made. This subject will be dealt with in two parts: first, shell-side cleaning; and second, tube-side cleaning. As previously mentioned, the effectiveness of this cleaning method is dependent on the nature and extent of the fouling material. Fig. 4a shows a typical bundle as brought to the unit and Fig. 4b shows the same bundle after cleaning.

Shell-side cleaning . . . The type of bundle construction is an important factor. When cleaning a square pitch bundle, proper alignment of the blast stream with the tube spacing allows the stream to be sent completely through the bundle with a minimum amount of diffusion or loss of velocity (see Fig. 5). In a triangular pitch bundle, this is not possible and the effectiveness of the unit is considerably reduced. This brings to light a major point which affects cleaning with this equipment. Some opening must exist to permit the sand to leave the area being cleaned after it has lost its velocity. Even in square pitch bundles, if the fouling material is packed solidly, some manual cleaning must be performed to provide an opening.

High pressure wet sandblasting has proved effective in removing all deposits encountered on the shell side with the exception of heavy, sticky tars as shown in Table 1. The toughness and resiliency of these substances prevent their removal by this cleaning method. In the case of tars, it has been found that satisfactory results can be obtained by blasting after a period of chemical soaking in vats. A comparison of a very limited amount of data indicates that the heat-transfer coefficients obtained after cleaning with high-pressure sand compare very favorably with those obtained by other cleaning methods when the deposit can be economically removed by the sand-water stream. A summary of the data obtained during the first 6 months of

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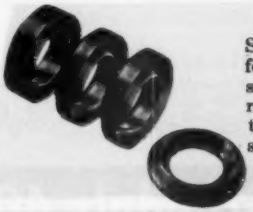

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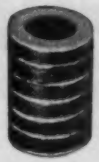

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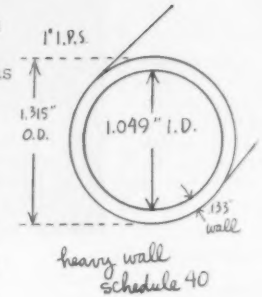

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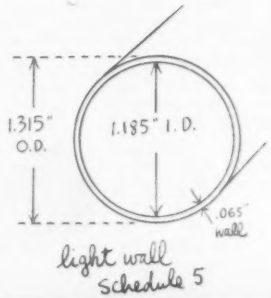

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operation is shown in Table 2. Further tests are being made to establish the validity of this initial data.

Tube-side cleaning . . . High-pressure wet sandblasting is not as effective in removing deposits from the tube side and is limited to similar types of deposits as on the shell side. For this cleaning each tube must have some free opening for the blast to be effective. If a tube is completely plugged, it quickly fills with the sand and water mixture without any cleaning being accomplished. If any plugged tubes exist in a bundle, they must be drilled before the blasting operation is begun.

The distance between the nozzle of the blast gun and the tube is an important factor in efficient cleaning. A distance of 1 in. is believed to be the best spacing. When the tube end is placed too far away, the natural flaring of the blast stream reduces the quantity of the mixture admitted to the tube. Naturally, this reduces the efficiency of the operation. For this reason, special consideration should also be given to the nozzles used on the end guns to see that flaring is kept to a minimum.

In addition to the loss of effectiveness due to reduction of the quantity of mixture entering the tube, a jet which flares too widely allows too much of the blast stream to be directed against the tube sheet causing wear on the tube sheet and severe spatter which reduces the visual control of the operator. When the gun is placed closer than 1 in. to the end of the tube, the blast stream hits the tube several inches from the end and it is not possible to achieve good cleaning near the tube end.

Difficulties and Modifications

When this unit was first placed in operation, it was noted that the sand being washed into the sump had a tendency to pack. As a result, the sand pump was at times pumping practically pure water and then a sudden slump would deliver large quantities of sand at once. This problem was overcome by the installation of an air agitation system in the sump.

Additional guns . . . In the discussion of the flow through the system, it was shown that the number of guns which could be operated at one time was limited by the capacity of the pumps. Consideration is now being given to the possibility of installing a third 30-g.p.m. high-pressure pump to permit the simultaneous use of the side gun and one end gun. Such an operation could considerably reduce the time

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The Hydro-Blast method employs a water blast with sand entrained, at pressures up to 2000 psi.

It is safe, easy to operate. Nozzle is controlled outside the enclosure—movable laterally the full length of 30-foot enclosure, vertically in a range of 4½ feet; swivels in 90° cone. Exchanger bundles to be cleaned are rotated by chain-driven mechanism. Nozzles mounted in end-doors clean inside of tubes.

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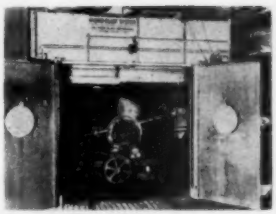
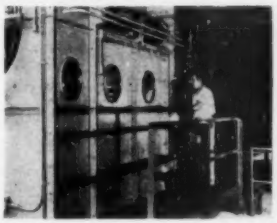
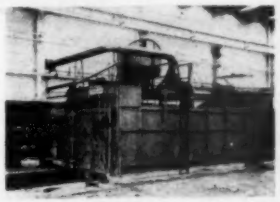


Hydro-Blast jet of water-and-sand in action—chain drive rotates the bundle.



Hydro-Blast gun, controlled outside, swivels in 90° cone, moves easily along length of enclosure or up and down.



Work car carrying heat exchanger bundles moves, on rails, enters Hydro-Blast enclosures at one end, out the other.

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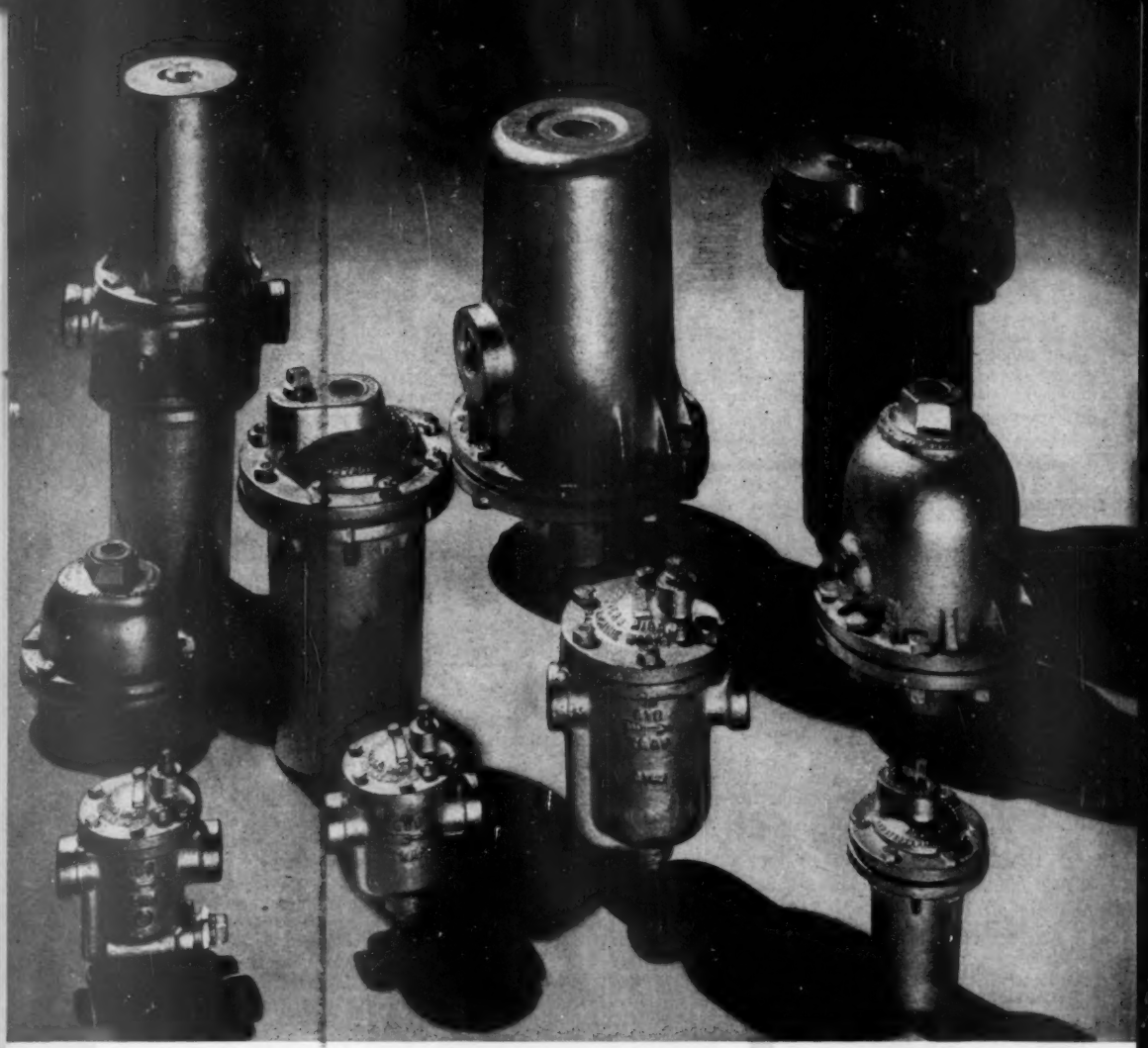

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required for cleaning a bundle. To make this possible, the size of the sand pump would have to be increased. In addition to obtaining a larger sand pump, studies show that the use of a rubber-lined pump might prove advantageous in combating the severe erosion problems being met with the present type pump.

Erosion is also extremely important in nozzle life. The nozzles first used on the guns were serviceable only for 30 to 60 hours. However, after experiments conducted with boron carbide-lined nozzles, it was found that the service life of the nozzles was increased to approximately 250 hours, and that the difference in cost of the two nozzles was negligible. Accordingly, the use of the boron carbide-lined nozzles was adopted as a standard for the unit.

Additional work car . . . The work car is mounted on rails set into the floor and extending approximately 25 ft. beyond the unit at each end. As the rails do extend on each end, some thought is being given to the possibility of placing the turntable on a separate car to be placed at one end while the car with the rollers is left at the other end. In this way, a tower tray to be cleaned could be set on the car and be ready to move into the room at one end while a cleaned tube bundle is taken from the other end, and vice versa. Such an arrangement would increase the flexibility of the unit and would reduce unit time lost while equipment is being set up for cleaning.

In conclusion, it should be noted again that high-pressure wet sandblasting is doing a good job in tube-bundle-cleaning service as well as in cleaning other items of equipment. In general, results have shown that the average cleaning time for tube bundles has been cut approximately in half by the use of this method instead of mechanical cleaning and less labor is required during cleaning. However, in the final analysis, the true efficiency of the unit must be reckoned not only by reduced cleaning time, but also by increase of heat-transfer coefficient. Test results indicate that the increase brought about by this method compares favorably with that brought about by other methods.

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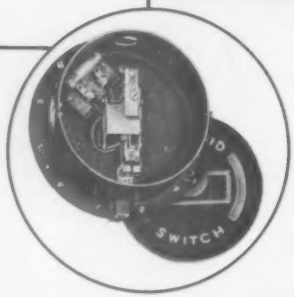

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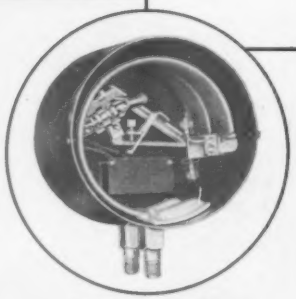

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How To Analyze Large Core Samples

(Continued from page 95)

mately doubled because the methods fill the pore space with high-pressure gas and then expand the gas to atmospheric pressure. This is satisfactory for 1-in.-diameter samples, but the equilibrium time increases beyond practical limits for large-diameter, tight-core samples. Preliminary development work proved this point and as a result the Coberly-Stevens procedure* for Boyle's law porosity measurements has been adapted to full-diameter cores.

Fig. 6 is a diagrammatic sketch of the apparatus for porosity measurements. The volumes of the chambers and core and the pressures involved are designated by letters and subscripts. The basic equation as presented by Coberly and Stevens is:

$$V_g = (V_1 + V_c) - V_1 (P_1/P_c) \quad (2)$$

where the volumes of the core and high-pressure chambers and the grain volume of the sample are as designated in Fig. 6.

P_c is the equilibrium pressure reached when gas from the high-pressure chamber is allowed to flow into the core chamber which is initially at atmospheric pressure. The operation of the apparatus consists of placing a core in the core chamber, connecting the two chambers by opening a valve, and then reading the equilibrium pressure when air from the smaller chamber expands into the core chamber. This method offers the advantages of maximum core area exposed to flow, only one pressure cycle, and

*A.I.M.E. Trans., Vol. 103, p. 261, 1933.

an extremely simple operating procedure. Metal sleeves which fit into the core chamber are provided for cores of varying diameters from 2 to 5 in.

The porosimeter is calibrated by means of metal plugs of known volume. This calibration is performed by placing one or more of the metal plugs in the core chamber, expanding air from V_1 into the core chamber, and reading the equilibrium pressure on the manometer. By determining the equilibrium pressure at intervals over the range of grain volumes expected for any particular diameter of core, a calibration curve of equilibrium pressure versus grain volume can be plotted. The gas used is air and is initially at a constant pressure of approximately 90 in. of mercury gage. Helium gas is used for samples of low permeability and high porosity where adsorption might affect the accuracy of measurement.

Equation 2 is the basic equation which relates the pressures and volumes involved in the Coberly-Stevens application of the gas laws to the determination of the grain volume of porous media. Since the values of V_1 and V_a in Equation 2 can be determined very accurately by averaging a large number of calibration determinations, the accuracy of the method is limited by the accuracy of the pressure readings.

A 100-in. mercury manometer was therefore selected as the most practical pressure measuring device for this method. This sets the maximum value of P_1 in Equation 2. The maximum change in equilibrium pressure over the range of grain volumes to be expected can be utilized by holding the volume of the core chamber to a minimum and selecting the optimum volume for the high-pressure chamber.

If values of the maximum and minimum grain volumes to be expected are selected, Equation 2 can be utilized to give an equation expressing the change in equilibrium pressure as a function of P_1 and the volumes involved. By differentiating this equation and solving for the condition at which the change in equilibrium pressure is a maximum, the optimum volume for the high-pressure chamber, V_1, can be calculated. The result of such a mathematical manipulation is presented in the following equation:

$$V_1 = [(V_a - V_m)(V_a - V_s)]^{1/2} \quad (3)$$

where

V_1 = volume of high-pressure chamber
V_a = volume of core chamber
V_m = maximum of grain volume
V_s = minimum grain volume

Equation 3 gives the volume of the high-pressure chamber where the difference in the equilibrium pressures is the greatest for grain volumes over the range expected. This is the volume of the high-pressure chamber where the sensitivity is the greatest.

The accuracy of measuring porosity by this method is a function of the accuracy of measuring the grain and bulk volumes of a core sample and the extent to which temperature is constant. If pressures can be read to 0.3 mm., temperature varies not more than 0.2° F., and the bulk volume is measured accurately by a mercury volumeter, the accuracy is ±0.5 per cent porosity for cores having 1 per cent porosity and bulk volumes not less than 250 cc. As the sample size increases, the accuracy of porosity determination increases correspondingly.

Fig. 7 presents an approximate answer to the question of the maximum and minimum times to reach equilibrium in a porosity test. Nine core samples representing all types of formations were selected for testing and the time necessary to reach equilibrium for each sample was determined. These times and the respective porosities are shown in Fig. 7. Porosities greater than 14 per cent reach equilibrium in approximately 4 minutes or less, while samples having less than 1 per cent porosity may take as long as 36 minutes.

Comparison of Data on Large Cores and Small Plugs

Porosity and permeability . . . Tables 1, 2, and 3 present the results of porosity and permeability measurements on small plugs drilled from full-diameter cores as compared to the measurements on the core itself. Tables 1 and 2 in addition compare the permeabilities on the large cores as determined by the previously described method using the longest flow-path length to the permea-

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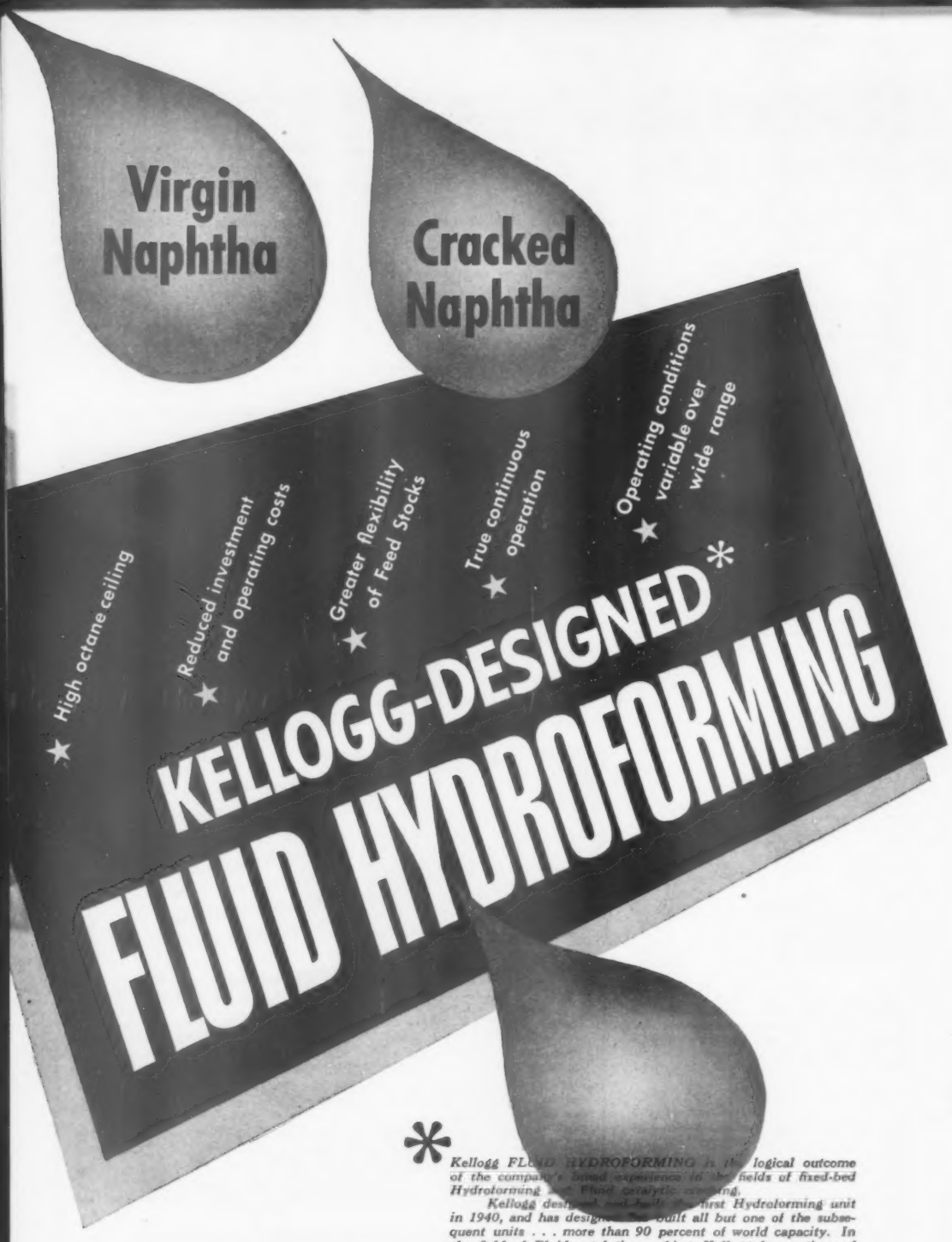

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bilities of the samples when the flow-path length is reduced 50 per cent by drilling a ⅜-in.-diameter center hole. The small plugs of Table 1 were selected at random from a 6-in. length of large core in the frequency of two per core. The small plugs of Table 2 represent the maximum number which could be drilled from the large core and vary from a minimum of 7 to a maximum to 25 per 6-in. length of large sample.

Table 3 presents average porosity and average permeability values for a number of large core samples and small plugs drilled from a full-diameter sample adjacent to these large samples. Two hundred ninety-one samples from 11 formations are represented in Table 3. The average large core and small plug values are shown for each formation. When each formation was represented by more than one well, the formation name in Table 3 has been repeated.

Porosity

Table 1 shows only 6 cases out of 16 where the best plug porosity is within ±0.5 per cent porosity of the large sample. If the average of both plugs is compared, then only four checks are obtained.

Table 2 presents a much better check between average plug and large core porosities; however, this is not surprising when the number of small plugs per large core is considered.

Table 3 presents data compiled during routine analysis of large core samples and shows definitely greater porosities for the large cores as compared to the plugs.

Permeability

Full diameter vs. plug values . . . The permeability data of Table 1 show that small plug measurements in certain types of formations give values definitely much lower than the permeability of the large core. This is very apparent when comparing permeabilities for Samples 301, 3, 25, 27, 28, 24, and 26. When the number of small plugs per large core is increased greatly and the formation is of uniform character, the small plug averages tend to give values which are much closer to the true permeability. This is apparent by examining the permeability data from Table 2. However, the permeabilities of individual plugs cut from any one large sample sometimes show considerable differences.

Table 3 shows greater permeabilities for the large cores than the small plugs. The differences in permeability are not too significant for the clean sands. The differences in the permeabilities for the limestones, however, are quite significant, and in the case of the vugular and macrofracture types of porosity, the permeability ratios approach 10 to 1.

Large core permeabilities by two methods . . . The permeabilities listed in Tables 1 and 2 under the heading "Linear" have been determined in the multiple sample permeameter utilizing the maximum flow-path length; the column headed "Radial" presents permeabilities determined by a separate method after a ⅜-in. diameter hole has been drilled through the center of the large sample. This hole extends for the length of the sample.

Table 1 shows seven samples which have radial permeabilities ranging from approximately two to five times the corresponding permeability by the linear method.

Table 2 shows only one sample in which there is a significant difference in the permeabilities by the two methods. This is not surprising when it is realized that the samples of Table 2 represent pore space types having no fracture systems and very little solution vugs, types more abundant in the samples of Table 1. It is believed that the reduction of flow-path length in the radial permeability samples cause the increased permeabilities. It is possible for a fracture or solution vug system of pores to exist in a core sample in such a manner that it does not extend for a length equal to the diameter of the core. Drilling a ⅜-in.-diameter hole through the center could intercept such a system and result in measured permeabilities greater than could be found by flowing across the full diameter of the sample.

Acknowledgment

The authors wish to acknowledge the assistance of R. P. Vincent in the design of the permeameter, G. W. Tracy for the mathematical solution to optimum conditions for the porosimeter, and R. A. Morse and H. H. Thompson for their constructive criticisms. The authors also wish to thank Stanolind Oil & Gas Co. for permission to publish this paper.

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Digests of A.I.Ch.E. Papers

Here are abstracts of papers of interest to the petroleum industry, presented at the regional meeting of the American Institute of Chemical Engineers, Chicago, September 11-13.

Fluidized Solids Technique In Petroleum Industry

R. C. GUNNESS, Standard Oil Co. (Ind.), Chicago.

ONE of the most significant achievements of chemical engineers in the past 20 years has been the development of the fluidized-solids technique, particularly as applied to the handling of catalysts in the petroleum industry. This technique permits a close approach to ideal operating conditions. It allows continuous operations with catalysts requiring frequent regeneration. It gives essentially isothermal operation, even for highly exothermic and endothermic reactions, and it is well adapted to adjustment of activity by additions of fresh catalyst.

In catalytic cracking the fluid technique has permitted maximizing of gasoline yields and minimizing of coke and dry gas. In hydrocarbon synthesis, fluid catalysis has made it possible to remove the large amounts of heat produced in this exothermic reaction. In oxidation reactions, notably the manufacture of phthalic anhydride, yields have been significantly improved through the decrease in side reactions. In hydroforming, the fluid process permits higher octane numbers at favorable liquid yields; this is particularly important in view of the increased need for upgrading of virgin naphtha. The fluid technique may well contribute to processes not yet commercialized—for example processing of oil shale and of powdered coal.

Use of the fluidized solids technique in the petroleum industry can be expected to undergo further expansion. The technique will also be used to an increasing extent in other industries.

Mixed-Bed Demineralizing of High-Pressure Boiler Feed Water

MARTIN E. GILWOOD, Permutit Co., New York.

MIXED-BED demineralizing produces a low-electrolyte, low-silica-content effluent which is of special interest as makeup to high-pressure boiler plants. An automatically regenerated mixed-bed demineralizing installation at a public utility steam-electric station is described.

Test data obtained with mixed-bed demineralizing indicate that silica can be reduced readily to the extremely low residuals required for high-pressure boiler-feed purposes. Silica removal with mixed-bed demineralizing results are compared with those obtained with the two-step demineralizing treatment.

Fluidization of Solid Particles In Liquids

E. WAYNE LEWIS and ERNEST W. BOWERMAN, Humble Oil & Refining Co., Baytown, Tex.

THE flow characteristics for batch fluidization of fine nonuniformly sized solids in liquids have been investigated and compared with the results using constant-diameter glass spheres in the same region of flow resistance (Stokes law region) previously reported by other investigators. The data have been correlated through free motion considerations of these systems. To cover the entire range of flow resistance as encountered in chemical engineering practice, previously published results of batch liquid-solid fluidization systems in the Intermediate and Newton's law regions have been used to develop similar correlations.

From the results of experiments performed in the batch fluidization of nonuniform sized solid particles by means of upflowing hydrocarbons, it was found possible to represent the relationship between the flow characteristics and the behavior of the fluidized bed by a new dimensionless equation.

The correlations to be presented are new, consistent, and easily used for predicting the performance of batch liquid-solid systems over the full range of fluidization conditions.

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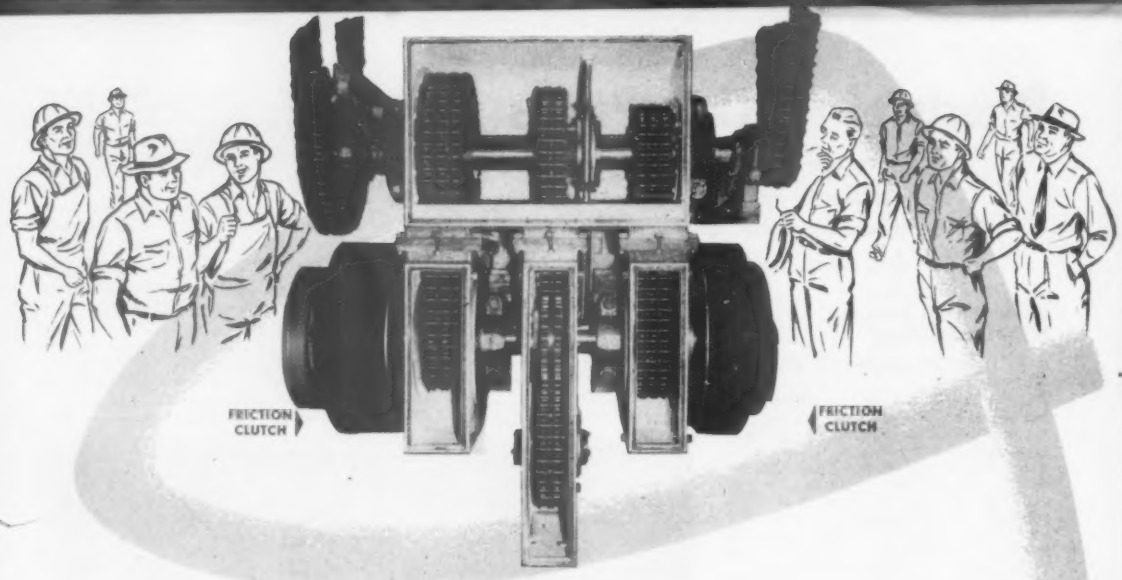

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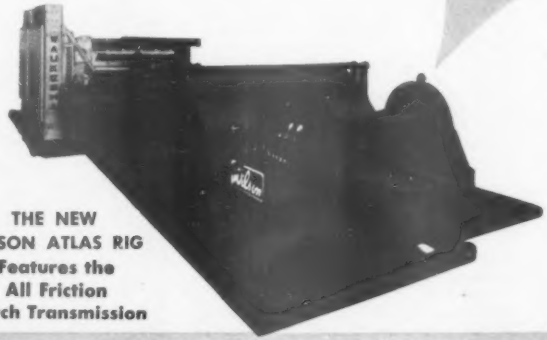

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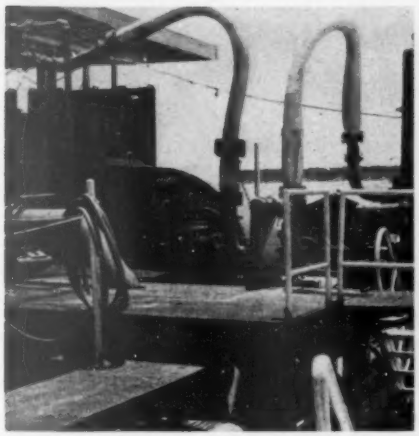
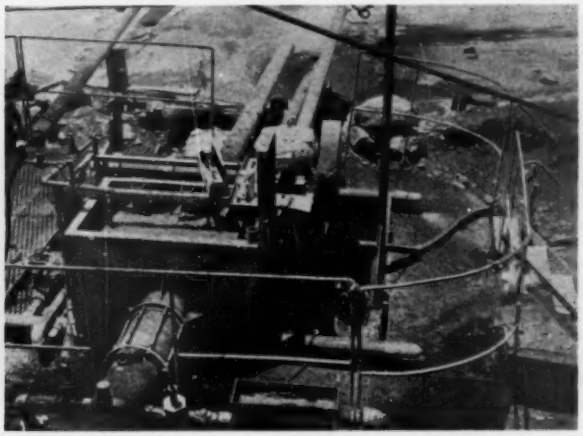


SLEEVE COUPLINGS correct misalignment that occurs on suction piping during rigging-up operations; hammer couplings are used to connect discharge piping.



SAMPLE-CATCHING DEVICE for trapping of well cuttings is this new concrete-lined bath mounted on mud-discharge line. Shale shaker is completely surrounded by walks and railings.

Cutting Down on Rigging Up

New Phillips drilling rig in West Texas has features to speed every-day operations

AMONG the new operating ideas featuring a new rotary drilling rig designed for Phillips Petroleum Co. now in operation southeast of Fort Stockton in West Texas, are the following:

- Concrete-line bath for sample catching.
- Sleeve couplings on suction piping to correct misalignment.
- Ball-bearing-equipped shaft for drilling-line spool.
- Multifunction light poles for shed supports or guard-rail posts.

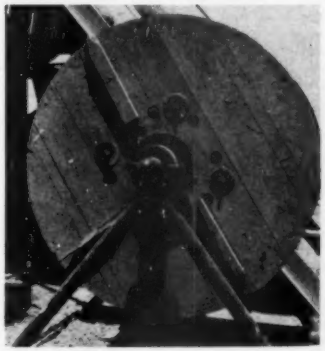
Misalignment No Worry

PLACING of sleeve couplings on suction piping on a drilling rig allows for a minor degree of misalignment that occurs during rigging-up operations. Hammer couplings are used to connect discharge piping. The key to alignment is one of these hammer couplings; if that particular coupling is in line and can be flanged up, all other joints are in nearly perfect alignment for connecting up.

Ball Bearings Ease Reeling

A BALL-BEARING-EQUIPPED drilling-line reel is a practical feature of a new rotary rig designed for Phillips Petroleum Co.

A pair of worn ball bearings were



BALL-BEARING MOUNTING makes reeling of drilling lines easy. This framework mount fits into substructure for skidding.

fitted into the frame to a shaft that extends through the drilling-line spool.

Rig designers arranged the mounting for fitting into the substructure so that the reel mount moves with the rig during skidding operations.

Substructure Tool House

A SUBSTRUCTURE tool house with a hatchway is a unique feature of this rig. At the ground level, a door is cut into the side of the house to afford access to the crew. In addition, a hatchway is cut into the rig floor to provide for access to the tool house so that the rig catline can be used for lifting equipment onto the derrick-floor.

Matting boards are eliminated through the use of steel plating to cover the bottom of the rig substructure. Metal grating likewise is used for construction of platforms and walks around the pumps and pits. These permit walking all the way around the rig without stepping on the ground.

DOUBLE-DUTY functions of light poles are for shed supports or guard-rail posts.

HANDLING HOT DRUMS of asphalt is part of the single continuous production-type operation at the Vernon, Calif., plant of General Petroleum Corp., as shown above.

FRICTION-TYPE HOOK mounted in groups of four on a single-gang scaffold suspended from the fork of a lift-truck, is the basis for mass handling of asphalt drums.

Drums Aweigh!

General Petroleum Corp. loads eight heavy drums in time usually required to load one

TIME and storage space are both cut to a minimum in drum-handling operations by handling four drums at a time. The use of a multiple-head friction hook by two fork-lift trucks permits the loading of eight 536-lb. oil drums in the time usually required to load one.

The export department of General Petroleum Corp. recently loaded 45,000 drums on the S.S. "Sula" to supply a shipment of paving asphalt for the Karachi, Pakistan, office of Standard Vacuum Oil Co.

Operations Streamlined

To expedite operations, a new departure in production-line operations was placed in effect at the Vernon, Calif., plant of General Petroleum. The drums were run through the production line, filled, topped, stenciled, and capped in a single continuous operation. Since the drums are filled at a temperature of 300° F., a cooling period of several hours must precede the "topping" or extra filling operation. (This step must be taken to make up for the shrinkage which occurs as the asphalt cools).

Stacking of the drums between the filling and topping operation normally takes time and a considerable amount of floor space must be provided for stacking the drums to cool.

Four at a time . . . By placing a four-at-a-time handling method in operation, both storage space and process time were cut to a minimum.

Drums, placed four to a pallet, were fed through the production line. A multiple filling head was designed and used to fill four drums at a single operation. After the drums are allowed to cool, the topping, capping, and stenciling steps are carried on in the same manner.

Friction hooks . . . Operations were expedited by the use of a device consisting of four friction hooks suspended beneath a single-gang scaffold; the scaffold in turn is mounted on the vertical extension of fork-lift truck as shown in an accompanying photograph.

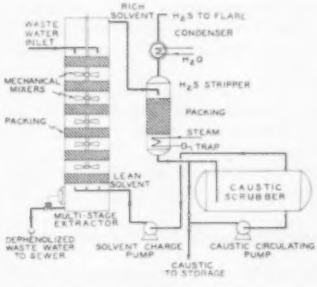
With this device, one fork-lift-truck operator can lift four of the heavy drums with the ease that one would lift a glass of water from his dining-room table!

Handling hot drums of asphalt is also made possible by the use of these special friction-type hooks which were devised by Ted Violette, Long Beach, of Trans-Harbor Trucking Co., who handled part of the drum-loading and shipping operations.

Acknowledgment is made to General Petroleum Corp. for the data and photographs used in the preparation of this article.

Pilot-Plant Unit for Waste-Phenol Removal

HIGH efficiencies in waste-phenol removal have been obtained in a pilot-plant refinery installation. A reduction in phenol content up to 99.9 per cent has been made through the use of a multistage countercurrent extraction process employing a mixed solvent of benzene and cracked gasoline. This application is effective on a system where the accumulator wastes exceed 200 p.p.m.

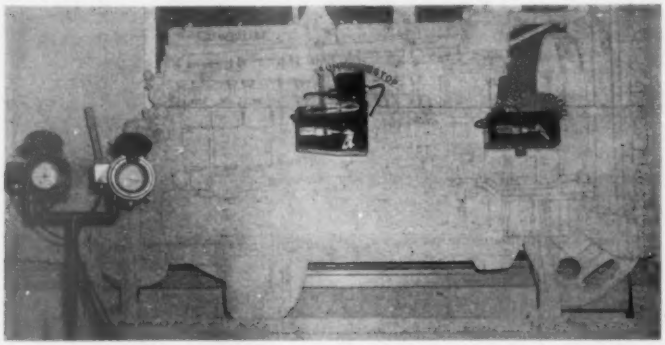


FLOW SHEET of multistage, countercurrent extraction process used by pilot plant.

Waste-phenol removal is a problem particularly important to refiners employing catalytic cracking units.

James A. Biehl, Ohio Oil Co., who describes the pilot plant shown here uses a solvent mixture of 66 per cent benzene and 34 per cent cracked gasoline. This mixture offers the best compromise between solvency power, cost, and commercial availability.

In practice, a ratio of 2 parts solvent to 1 part of waste water is used.



UNUSUAL APPLICATIONS of time clocks with solenoids for diesel pumping engines are shown above. Electric cables from time clocks at left connect with shutdown device at center and with fuel-changeover device at right.

Time Clocks for Diesels

Interstate Pipe Line Co. uses solenoid-operated relays for pumping engine control

THE use of time clocks with solenoid-operated relay devices has been applied to control of diesel pumping engines by Interstate Pipe Line Co. at its Park, La., station.

Applications at Park station include:

- Shutdown device for diesel-pumping unit.
- Fuel changeover device for diesel engine.

Details of both of these applications are shown in an accompanying photograph as well as by individual diagrams.

Shutdown devices . . . A time-clock-controlled shutdown device for a diesel unit has brought about savings of $600 per month at this station. Its use has not only eliminated the need for employing a second-shift operator but has released the first-shift operator one-half of the time to work at other pumping stations on the same system.

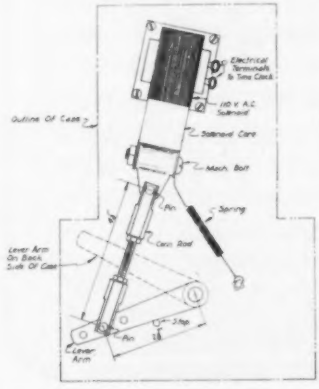
The control system comprises a time clock, an electrical cable, and a solenoid-operated relay. The time clock (mounted on a standard at the left of the photograph) is connected electrically to the solenoid-operated relay mounted on the engine cutoff valve. When clock hands reach preset shutdown time point, an electrical circuit is closed energizing solenoid; this pulls connecting rod on lever arm from "run" to "stop" position, thereby shutting off diesel pumping unit. Solenoid relay may be used with a 6, 12, or a 110-volt power source.

Fuel changeover device . . . Interstate pipe line personnel employ the practice of purging the entire fuel system of heavy crude oil prior to shutdown. This is done by switching from crude to diesel fuel prior to shutdown by use of a time-clock arrangement preset to operate 30 minutes. ahead of shutdown time point.

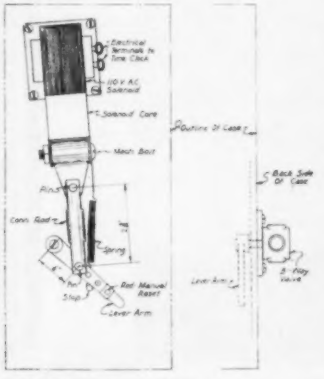
An electrical cable connects the time clock with the circuit of a solenoid-operated relay. When switchover time is indicated on time clock, an electrical circuit is closed energizing the solenoid relay; a connecting rod attached to the solenoid relay moves the lever arm on the diesel engine which operates a three-way valve. The valve is arranged to shut off the crude supply and allow the diesel fuel to enter the fuel line of the diesel engine.

In this manner, operating economies which accrue from use of crude oil are obtained. By switching over to diesel fuel, just before shutting down the engine, heavy oil is not allowed to remain in the engine overnight. Moreover, the presence of an operator is not needed to make the changeover.

Henry A. McKee, Shreveport, mechanical foreman at the Moore, La., station of Interstate, originated these applications.



SHUTDOWN DEVICE comprises a lever arm actuated by movement of solenoid connected by electrical cable to time clock.



CHANGEOVER DEVICE is a three-way valve operated by a lever arm mounted on the back of the solenoid case.

Trailer-Type Tool Room Saves Man-Hours

MANY man-hours for maintenance crews are saved by the new mobile trailer-mounted tool room in operation at the Oleum, Calif., refinery of Union Oil Co. of California.

The portable unit, mounted on truck wheels, is hauled to the job by hitching it to a truck. It is equipped with all of the necessary tools required for the various maintenance jobs encountered in every-day operation at the refinery.

A feature of this mobile tool room is a short-wave radio telephone and a powerful public-address system.

In practice for the past few months, the new unit has enabled maintenance crews to expedite routine work and to improve the flexibility of operations.

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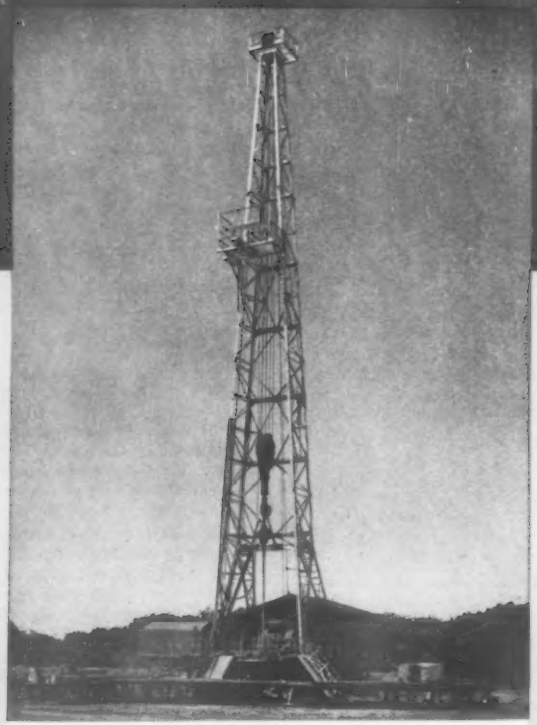

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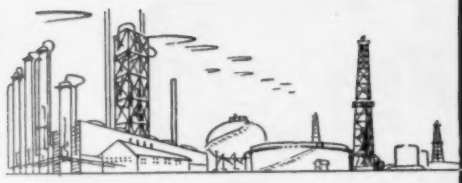

THE JOURNAL'S WEEKLY
Engineering Reference
SECTION

No. 22

FANS AND BLOWERS:

Part 3-Efficiency, Horsepower, Pressure

by M. Van Winkle*

TYPICAL fan characteristic curves are shown in Fig. 1 for three-blade arrangements of radial or centrifugal-type fans and one axial-flow-type fan. Efficiency, power and pressure are plotted against the variable of per cent of wide-open volume. Thus, at 100 per cent of wide-open volume, the fan is delivering the maximum volume of which it is capable, and at zero per cent wide-open volume, zero volume of air or gas is passing through the fan.

In examining these curves it is interesting to note that the maximum efficiency (mechanical) for none of these fans and blade arrangements occurs at 100 per cent wide-open volume. In addition, the maximum efficiency produced by these various fans is approximately of the same magnitude, but the point of maximum efficiency varies with the fan type with respect to the volume output. In addition, it is to be noted that the static pressure produced by the fan falls off in each case to zero at 100 per cent wide-open volume. This means that if the fan or blower were to be used to deliver gas at a discharge pressure higher than the inlet pressure, the fan would have to be operated at a discharge volume lower than its maximum. With regard to horsepower requirements, the axial-flow-type fan has a fairly constant horsepower requirement regardless of the percentage of wide-open volume which is delivered. The straight-blade and forward-curve-blade radial-flow fans require an increased horsepower for increased volume throughput rising to a maximum at 100 per cent of wide-open volume. On the other hand, the backward-curve-blade radial flow fan increases in horsepower requirement up to a maximum at approximately 70 per cent of wide-open volume, then falls off slightly as the volume produced approaches 100 per cent. Table 1 gives a qualitative comparison of the four different fan-type characteristics.

*Professor of chemical engineering, University of Texas.

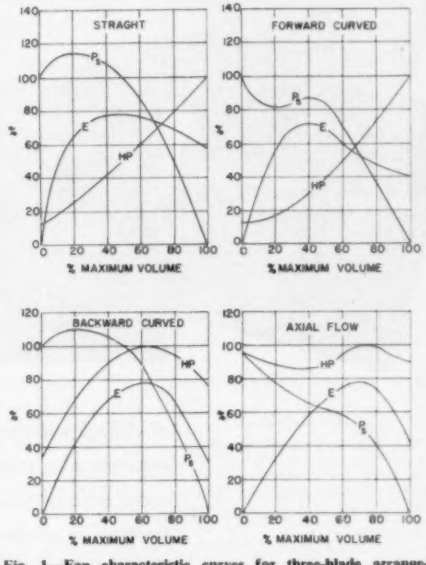

Fig. 1—Fan characteristic curves for three-blade arrangements of radial fans and one axial-flow-type fan.

TABLE 1—FAN CHARACTERISTICS

	Radial			Axial
	Straight blade	Forward curved blade	Backward curved blade	
P_s—Discharge pressure	Maximum at about 25 per cent volume delivery.	Decreases then increases somewhat then decreases. Maximum at zero per cent delivery.	Maximum at about 25 per cent volume delivery.	Decreases as volume delivery increases. Maximum at zero per cent volume delivery.
H.P.—Horsepower	Gradual increase with volume output.	Gradual increase with volume output.	Increases to maximum at around 65 per cent volume output, then decreases.	Decreases with volume output then increases to maximum at about 75 per cent.
E—Efficiency	Maximum at around 50 per cent volume output.	Maximum at around 40 per cent volume output.	Maximum at point of highest horsepower—65 per cent volume output.	Maximum at point of highest horsepower—75 per cent volume output.

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Relations Between Variables in Decline Curves

by Ralph F. Nielsen*

OF the types of empirical equations that may be found to represent production as a function of time, some can only be extrapolated to a limited future time, because they give obviously erroneous values as t becomes large. In general it may be expected that the production should approach zero asymptotically at infinite time. Some types which have this property will be discussed here.

Type 1. Constant Percentage Decline of Current Production (Fig. 1)

In this type of decline curve the current production ratio is decreased by a constant percentage in each time interval. Mathematically:

$$\Delta P = dP/dt = -kP,$$

$$\text{or } \ln P - \ln P_o = -k\,(t - t_o)$$

where k is the fractional decline per unit time interval and P_o is the production rate at t_o. This is often expressed as:

$$P = P_o e^{-kt} = P_o 10^{-at}$$

where t is measured from t_o and $a = k/2.3$. It follows that a plot of P against time (regardless of reference point) on semilog paper should be a straight line. Also the decline ratio, $P/\Delta P$, the current production at any period divided by the change in production between that of the given period and that of the previous period, should be essentially constant.

The relation of P and t to the cumulative production C from time t_o may be shown from the relation $dC = P\,dt$. Substituting for P from above and integrating gives:

$$C = P_o\,(1 - e^{-kt})/k$$

Thus a plot of C against P is a straight line on Cartesian paper with slope $-1/k$, the ultimate cumulative C^* (at infinite time) is P_o/k, and a plot of $C^* - C$ against t is a straight line on semilog paper.

Type 2. Uniform Decline of Decline Ratio (Fig. 2)

In this type the decline ratio is decreased by a constant percentage in each interval, or:

$$d\left(\frac{P}{dP/dt}\right) = -k\,dt$$

Integrating twice, $\ln (P + m) = -\ln (t + n)/k$, where m and n are constants. In the most general case, then, both P and t would have to be "skidded" to obtain a straight line on log paper. More commonly, however, a straight line is obtained by plotting P against time relative to some reference time. A method of finding how much t must be skidded is given in Engineering Fundamentals No. 360.[1]

If t^* indicates that "corrected" time, such a curve is given by:

$$P = at^{*-b}$$

Integration gives the cumulative:

$$C = a\,(t^{*1-b})/(1 - b)$$

the integration constant being zero if C is measured from $t^* = 0$. Thus a plot of C vs. t^* should also be a straight line on log paper.

A special case of the previous type is given by $P = a/t^*$. In such a case a 45° line is obtained on log paper and a straight line is obtained on reciprocal paper. If P is plotted on the reciprocal scale, either t or t^* gives a straight line. A relation between C and P is obtained from:

$$dC = P\,dt^* \text{ and } dt^* = -a\,dP/2P^2$$

Substituting for dt^* and integrating gives $C = -a\,(\ln P)/2 + a$ constant, a straight line on semilog paper.

*Associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

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1. Calhoun, Engineering Fundamentals, Part 2, The Oil and Gas Journal, 1950.
2. Pirson, Mathematical Methods of Decline Curve Extrapolation and Reserve Calculation, Oil Weekly, Sept. 9, 1946.

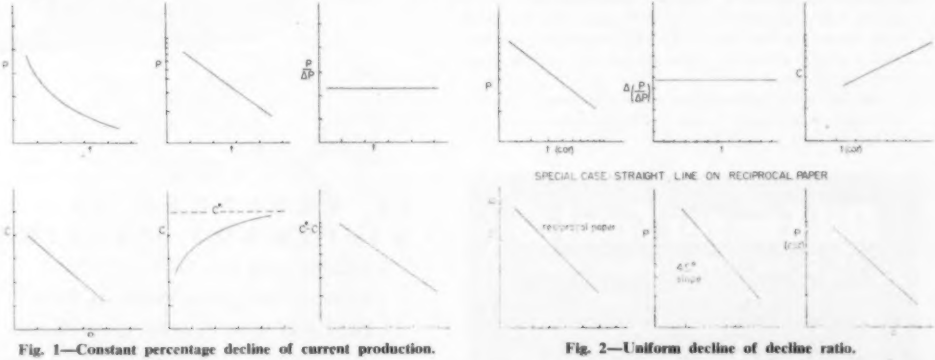

Fig. 1—Constant percentage decline of current production.

Fig. 2—Uniform decline of decline ratio.

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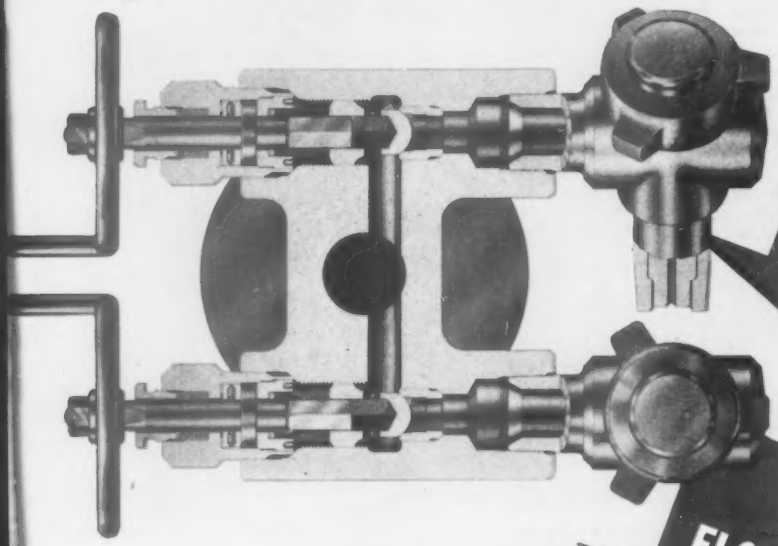

The New O-C-T

DUAL FLOW CONTROL

High on the list of advantages which the new O-C-T Dual Flow Control brings to the field is the fact that the operator can switch the flow from one size choke to another without closing in the well and thus changing any of the well's production characteristics. This feature is extremely important when running pressure bombs, temperature surveys and other wire line instruments. Besides the O-C-T Dual is the only compact dual assembly on the market in which the operator can use positive choke beans of all popular makes.

Ask your O-C-T representative or write for details. The new O-C-T Dual Flow Control is now available through more than 700 supply stores.

Oil Center Tool Co.

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Export Representatives: Sterling Areas – Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas.

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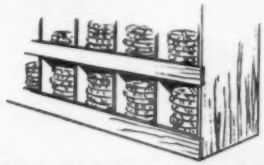
- ... Reduces cost as much as 70%
- ... Reduces weight as much as 85%
- ... Uses any type positive choke bean
- ... Provides easy operation even at extremely high pressures

Care of Oil-Field Chains*—5

STORING CHAINS

New Chains

1. Keep new chain in its box or wrapping. Store it indoors in a protected location. Don't keep it out in the open where rain and dust will cause deterioration.



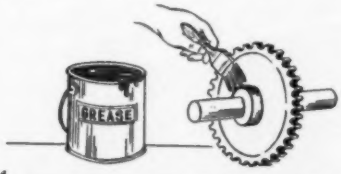
CHAINS ON IDLE DRIVE INSTALLATIONS

If the equipment on which the chain is used is to be idled for any length of time, the following protective measures will considerably prolong the life of your chain drives.

1. Remove chain from sprockets. (See "Helpful Hints" No. 3)

2. Cover the chain with heavy grease.

3. Wrap the chains in heavy paper and store inside.



4. Apply a coating of heavy grease to all finished surfaces on the sprockets.

5. Provide appropriate protection to prevent mechanical injury to sprockets.

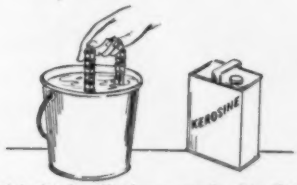
When the chains are put back in service, clean chains and sprockets.

CLEANING CHAINS

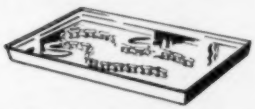
Periodical cleaning of chains adds much to chain drive life. Dirt and gummy lubricants cause unnecessary wear on internal bearing surfaces of pins and bushings. External dirt causes excessive sprocket wear.

To effectively clean chains and sprockets:

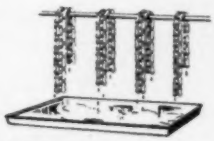
1. Remove chain from sprockets.



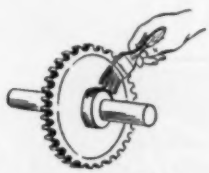
2. Wash the chain thoroughly in kerosene or gasoline. Drain off cleaning fluid.



3. Soak the chain in light oil (SAE No. 20-30) to restore internal lubrication of chain.



4. Hang chains over a drip pan to drain off excess oil.

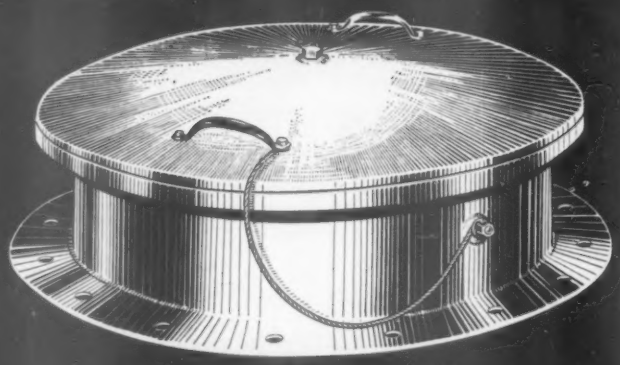


5. Thoroughly clean sprockets with kerosene or gasoline.

6. Inspect the chain and sprockets for wear or corrosion.

*Courtesy, Chain Belt Co., Milwaukee.

Solves Emergency Venting Relief —



THIS Shand & Jurs 20" Emergency Vent has been designed for mounting right on a 20' A.P.I. Standard manhole. Without any additional modification of a tank, the vent can be mounted and put into operation immediately. It is presented to meet a long-standing need in the Petroleum Industry for an emergency relief vent which will take care of most emergency venting necessities arising due to air surges, excessive or unusual pumping, or thermal conditions. It is not, however, intended for explosion relief.

Designated Fig. ST-5455, this Emergency Vent is automatically self-sealing. The cast aluminum pallet, which is also the manhole cover, provides a standard loading of 2½" water pressure. The sturdy steel base ring, which forms the seat for the pallet, has a hard stainless facing of Hastelloy B to resist corrosion, and is designed to resist mis-shaping, should the manhole flange be distorted or warped. To comply with Flammable Liquids Code requirements of many states, a safety cable is provided to fasten the free lifting cover to the tank. Special materials and loadings are available on specification.

S&J

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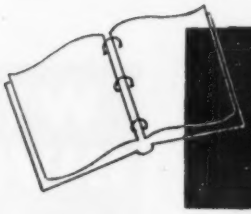

REFINER'S NOTEBOOK

Instrumentation and Waste Disposal

by John G. Dobson*

1. Blending of Acid and Alkali Waters

THE control of the pH of treated acid and alkali wastes is seldom a serious problem. However, those plants which are fortunate enough to have both acid and alkali wastes have found the system shown in Fig. 1 a convenient and economical way of blending their acid wastes. Government requirements on the pH of effluent material vary with the type of stream and the particular enforcing authority, but in most cases some reasonable latitude is allowed on pH of final effluent. This system is designed to maintain the pH within the required band but to allow variations of pH within that band depending upon the quantity of excess acid waste and excess alkali waste available.

Acid and alkali wastes . . . These are collected into separate collection tanks and the discharge of acid waste is maintained under control of the liquid-level controller in order to keep the level of the tank within reasonable bounds. A standard proportional-level controller is usually used. The quantities of alkali wastes being discharged and blended with the acid wastes in turn are controlled by the pH of the final mixed effluent. However, the actual control point of the pH controller is gradually varied by a pneumatic-set line from the differential-level transmitter which sets the control point within the allowable band depending upon the relative quantities of acid and alkali in the tanks.

For instance, when there is a substantial excess of acid over alkali, a pH controller control point is forced down to its minimum value while when a similar excess alkali exists, it is forced up to its maximum value. When the quantities of waste are approximately equal, approximate neutral conditions are called for by the set point of the pH controller. The additional controller consists of a liquid-level controller on the alkali waste tank which permits the addition of makeup alkali if the balance between acid and alkali from the plant fails.

*Application engineer, Foxboro Co. From paper presented at Texas A. & M. instrumentation symposium, 1952.

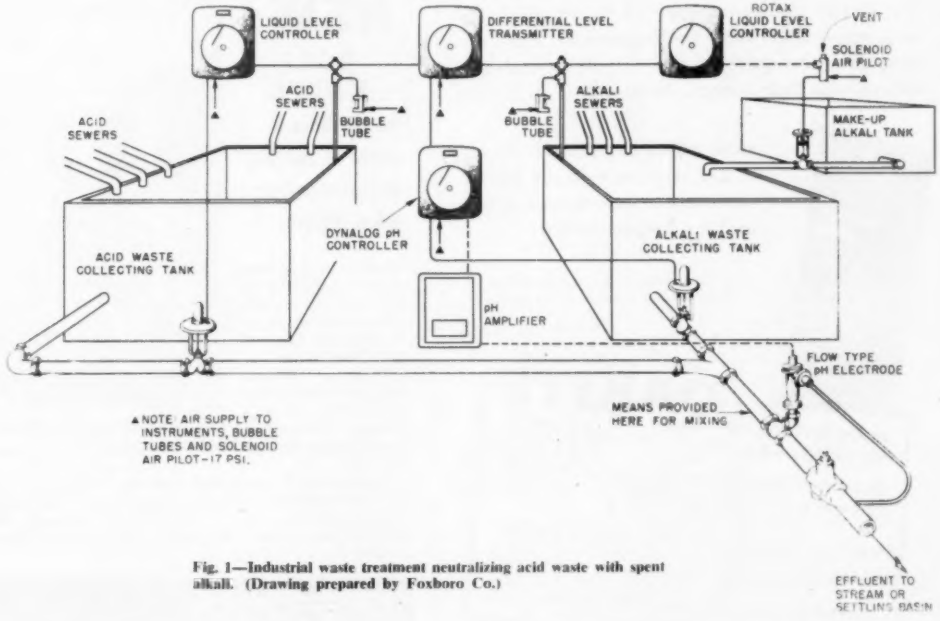

Fig. 1—Industrial waste treatment neutralizing acid waste with spent alkali. (Drawing prepared by Foxboro Co.)

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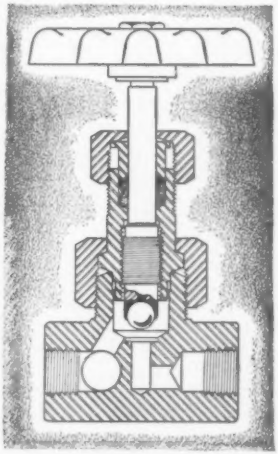

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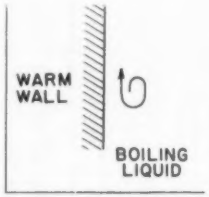
FOXBORO INSTRUMENTATION

Part 5 of a series

by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between SURFACE of WARM VERTICAL WALL and BOILING LIQUID



Liquid Movement: Natural Convection

EQUATION:

$$h_f = c + dq$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

q - Rate of heat flow, BTU/hr. sq. ft.

c-d- Constants depending on liquid boiling at atmospheric pressure.

h_a - Heat transfer coefficient at standard atmos. cond.

p_s - Pressure at standard atmospheric conditions.

LIMITATIONS: Depends on surface. Values above for clean copper surfaces. Values satisfactory except for extremely high or low rates of heat transfer.

SPECIAL DATA: Values of constants c and d.

Liquid	c	d	Liquid	c	d
Water	150	0.043	24% sodium chlor. soln.	100	0.030
Ammonia	190	0.042	Carbon tetrachloride	80	0.025
10% sodium sul. soln.	125	0.043	Normal butenol	80	0.025
26% glycerol	125	0.043	Methylene Chlor.	80	0.025
Kerosene	100	0.030	Methyl formate	80	0.025
Methanol	100	0.030	Ethyl ether	80	0.025

For heat transfer at pressures other than atmospheric.

Ratio h/h_a	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2
Liquid	Evaporation temperatures								
Water	95	127	154	173	188	200	210	220	229
24% sodium chlor.soln.			178	191	204	214	222	229	237
10% sodium sulphate soln.	125	148	168	180	190	200	211	218	226
26% glycerol	145	168	184	197	207	215	226	237	
Carbon tetchl.	91	103	116	126	155	168	180	190	
Methanol	66	90	108	125	138	148	156	161	
Kerosene		362	380	398	417	428	432		

SPECIAL CASE: For liquids not reported above, an approximation of heat transfer coefficients can be obtained by use of following equations.

$$h_f = 50(q)^{\frac{1}{3}}$$ q up to 1,000 BTU/hr.sq.ft.

$$h_f = 0.7(q)^{\frac{3}{4}}$$ q from 1,000 to 20,000 BTU/hr.sq.ft.

and for pressure corrections

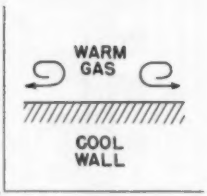
$$h_f = h_a\left(\frac{p}{p_s}\right)^{0.4}$$ Where p = pressure in space occupied by boiling liquid.

REFERENCES:

1. Introduction to Heat Transfer, Brown and Marco, pp. 125-127.
2. Elements of Heat Transfer and Insulation, Jakob & Hawkins, pp. 165-185.
3. Heat Transmission, William H. McAdams, Chapter X.

A 6

COEFFICIENT of HEAT TRANSFER through FILM between COOL HORIZONTAL WALL and WARM GAS



Gas Movement: Natural Convection

Wall Position: Facing Upward

Size of Wall: Small

EQUATION:

$$h_f = 0.35\,\frac{k}{L}\left[\frac{L^3\rho^2\beta\, C_p g \Delta t}{\mu k}\right]^{\frac{1}{4}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

k - Thermal conductivity of gas at t_f, in BTU/hr. sq. ft. °F./ft.

L - Length of wall, ft.

ρ - Density of gas at t_f, lb./cu. ft.

C_p - Specific heat of gas at constant pressure, BTU/lb. °F.

β - Coefficient of volumetric expansion of gas at t_f. (1/°R.) (cu. ft./cu. ft.)/°F.

g - Acceleration of gravity. 4.17×10^8 ft./hr.^{2}

Δt - Temperature difference between wall and gas, °F.

μ - Viscosity of the gas at t_f, lb./ft. hr.

t_f - Film temperature, °F. Assume to be arithmetic average of wall temperature and bulk gas temperature.

LIMITATIONS: Small surface less than 2 ft. section if turned in vertical position.

Factor $\left[\frac{L^3\rho^2\beta\, C_p g \Delta t}{\mu k}\right]$ must be between 10^8 and 10^9.

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

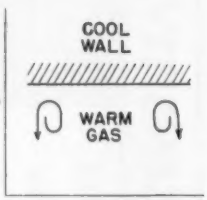
for ρ -- see pp. 130-148, 175-195, 1583.
β -- see pp. 370-374, 1196, 1696.
g -- see p. 200-202.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1588, 1696.

REFERENCES:

1. The Basic Laws and Data of Heat Transmission, W. J. King, Mechanical Engineering, p. 500, May, 1932.
2. Introduction to Heat Transfer, Brown and Marco,p.114.
3. Heat Transmission, William H. McAdams, pp. 237-251.
4. "Surface Heat Transmission", H. H. Heilman, Trans. Am. Soc. Mechanical Engineers, FSP 51, 287-304, (1929).

B 1 a (1) (a)

COEFFICIENT of HEAT TRANSFER through FILM between COOL HORIZONTAL WALL and WARM GAS



Gas Movement: Natural Convection

Wall Position: Facing downward

Size of Wall: Small - less than 2 ft. section.

EQUATION:

$$h_f = 0.71\,\frac{k}{L}\left[\frac{L^3\rho^2 C_p \beta\, g \Delta t}{\mu k}\right]^{\frac{1}{4}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

k - Thermal conductivity of gas at t_f, in BTU/hr. sq. ft. °F./ft.

L - Length of wall, ft.

ρ - Density of gas at t_f, lb./cu. ft.

C_p - Specific heat of gas at constant pressure, BTU/lb. °F.

β - Coefficient of volumetric expansion of gas at t_f. (1/°R.) (cu. ft./cu. ft.)/°F.

g - Acceleration of gravity. 4.17×10^8 ft./hr.^{2}

Δt - Temperature difference between wall and gas, °F.

μ - Viscosity of the gas at t_f, lb./ft. hr.

t_f - Film temperature, °F. Assume to be arithmetic average of wall temperature and bulk gas temperature.

LIMITATIONS: Small surface less than 2 ft. section if turned in vertical position.

Factor $\left[\frac{L^3\rho^2 C_p \beta\, g \Delta t}{\mu k}\right]$ must be between 10^8 and 10^9.

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

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3. Heat Transmission, William H. McAdams, pp. 237-251.
4. "Surface Heat Transmission," R. H. Heilman, Trans. Am. Soc. Mech. Engrs., FSP 51, 287-304, (1929).

B 1 a (1) (b)

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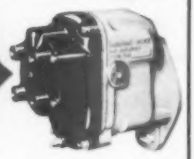

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by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Heat of Reaction in Viscosity Breaking

"We hear that 50 B.t.u. per pound of feed stock is a good heat of reaction for viscosity breaking. Isn't this a low value?"—S. P. D.

Much confusion exists regarding viscosity breaking because in many instances so-called viscosity-breaking operations have been little more than high-temperature distillations. Some operators are able to crack to pitch residues of 3°-5° A.P.I. (which are cut back to 6°-8° A.P.I.) on Mid-Continent stocks whereas others appear to be unable to produce fuel-oil gravities lower than 10-12. These differences are in large part attributable to different pipe-still or cracking-section designs. For many years several major lubricating-oil manufacturers operated at pipe-still outlet temperatures of 870° F. and even 900° F. without causing serious destruction of the lubricating oils but this was accomplished in high-velocity pipe stills. If more time is allowed, such temperatures will cause viscosity breaking or cracking to occur.

When scarcely any viscosity breaking is accomplished, the heat of reaction is about equal to the 50 B.t.u. per pound of charge stock that is mentioned in the question. In such an operation, a 14° A.P.I. charge stock can be converted into 5-8 per cent of heavy gasoline, 94-96 per cent of 14°-15° A.P.I. cracked fuel oil, and scarcely any gas. The liquid recovery ranges from 101-102 per cent based on the feed.

However, if real viscosity breaking is practiced such as to crack the 14° A.P.I. stock into 10 per cent of gasoline, 30-50 per cent of 18° A.P.I. cracked distillate, and 40-61 per cent of heavy cracked fuel oil, the heat of decomposition is much larger. As one illustration, note Table 1. From Table 1 it is seen that the heat of decomposition is:

Heat of decomp./100 gal.	= 84,600 B.t.u.
B.t.u./lb. feed	= 104.6
B.t.u./lb. gasoline	= 1,360

If really vigorous viscosity breaking, such as the production of 50-70 per cent of cracked distillate and a fuel oil pitch, the heat of decomposition is very much larger.

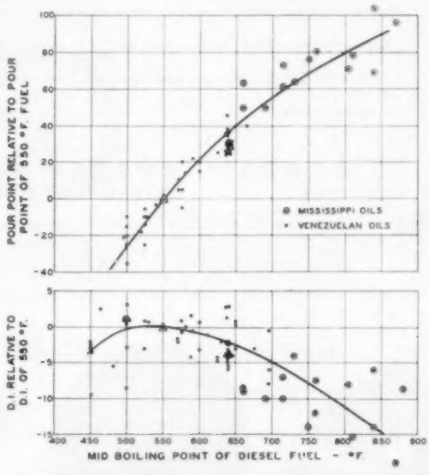
POUR POINT RELATIVE TO POUR POINT OF 550 °F. FUEL
MISSISSIPPI OILS
VENEZUELAN OILS
D.I. RELATIVE TO D.I. OF 550 °F.
MID BOILING POINT OF DIESEL FUEL - °F.

Fig. 1—Effect of midboiling point on the diesel index and the pour point of diesel fuels.

Effect of Boiling Point On Diesel Index

"How much is the diesel index of diesel fuels increased by producing a lower boiling fuel?"—S.M.T.

Although high-boiling fuels have low diesel indexes, it appears from Fig. 1 that the highest diesel index occurs when the boiling range of the fuel centers around 500°-550° F. Data were available for about 30 crude oils and by the scattering of points it is obvious that the relationship is only approximate. It is not clearly evident that the diesel index decreases when the midboiling point is lower than 500° or 550° F. Obviously, the curves apply only to diesel fuels that are produced from a single crude oil.

Example . . . A 500°-680° F. diesel fuel has a diesel index of 47 and a pour point of 25° F. The midboiling point is about 590° F.

If a 400°-700° F. (550° midpoint) is produced, according to Fig. 1, the diesel index will be higher by about 0.5 units or 47.5, and the pour point will be about 18° F. lower or will be about 7° F.

Likewise, a 600°-680° F. (640° midpoint) fuel will have a diesel index of about 47 minus 1.5 or 45.5, and the pour point will be about 25 plus 18 or 43° F.

TABLE 1—MILD VISCOSITY BREAKING OF 14° A.P.I. MID-CONTINENT RESIDUE

(Basis = 100 gal. of feed)

Material—	Per cent or gallons	A.P.I.	Lb. per 100 gal.	Characterization factor	Heating value, B.t.u./lb.	Internal energy, B.t.u.
Gasoline	10	58	62.2	11.75	20,600	1,281,300
Distillate	30	18	236.5	11.7	19,020	4,498,200
Gas	—1		13.2		22,150	303,400
Heavy fuel	61	13	498.0	11.4	18,760	9,133,100
	101					15,416,000
Feed	100	14	809.9	11.8	18,930	15,331,400
Heat of decomposition						84,600

GOOD NEWS!

GOODALL rotary hose is now available through ALL* SUPPLY STORES

Yes, for the first time in history, you can now buy Goodall Long-Life Rotary Hose through all supply stores. Goodall (the only rotary hose with the built-in Barney Coupling) has eliminated the cause of more than 90% of rotary hose failures . . . and is equipped with the only coupling that can be reset to save your hose from the scrap heap. That's why we would like to suggest that you tell your supplier you want Goodall the next time you need rotary hose. It costs no more than ordinary hose!

GOODALL RUBBER COMPANY
TRENTON, N. J

GOODALL RUBBER COMPANY OF TEXAS: Houston, Texas.
GOODALL RUBBER COMPANY OF CALIFORNIA: San Francisco, Los Angeles, Seattle, Salt Lake City, Portland
GOODALL RUBBER COMPANY: New York, Philadelphia, Pittsburgh, Chicago, Denver, St. Paul, Detroit
EXPORT: Goodall Rubber Company, Trenton, N. J.
STOCKING DISTRIBUTORS: Houston Oil Field Material Co., Wilson Supply Co., Ivorson Supply Co.

*Through all supply companies that maintain field stores.

OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

TRADE LITERATURE

1 AERATORS. Bulletin 100-B describes and pictures cascade, forced-draft, multicone, and coke tray aerators, as well as floating and adjustable cone aerator nozzles. Specifications and descriptive data are given on each model. *Infilco, Inc.*

2 BULLETIN BV-2 illustrates and describes the complete line of Brown cast steel valves. *Brown Valve Division, Vernon Tool Co., Ltd.*

3 SERIES 700 SINGLE-SEATED DIAPHRAGM VALVE is fully described and illustrated in new eight-page Specification Sheet 420, which gives pertinent data such as sizes, construction, trim materials, temperature pressure ratings for various body materials, pressure drops, and complete mounting dimensions. *Minneapolis-Honeywell Regulator Co., Brown Instruments Division.*

4 NEW TWO-COLOR THERMOMETER SPECIFICATIONS CATALOG describes complete line of Auto-Lite recording thermometers and gages as well as dial indicating thermometers. Applications, chart ranges, dial ranges, and accessories are listed, with outstanding blue-print illustrations to show varied types of installations of Auto-Lite Instruments. *The Electric Auto-Lite Co.*

5 MONCO-ALOCHROM GRADES FOR EVERY USE is a four-page bulletin describing aluminum-chromium paint. Printed in aluminum and black and illustrated with photographs and line sketches, new bulletin explains grades adaptable to all surfaces whether interior or exterior, hot or cold. *The Monroe Co., Inc.*

6 BUBBLE CAPS, REFINERY TUBES. Engineering data on 270 standard styles of bubble caps and risers are listed in new 24-page catalog, which also contains drawings for use in determining methods of bubble-tray assembly. Catalog illustrates processing equipment, tubes, welded tubing assemblies, and manifolds. *The Pressed Steel Co.*

7 A NEW WAY TO BUY GLUCOSATES is a booklet which describes particular use of 11 glucosates in correction and control of corrosion, scale, and algae. *D. W. Haering & Co., Inc.*

8 RED LINE MANOMETERS. Multicolored brochure illustrates and describes well-type, absolute-pressure, and U-tube manometers, indicating flow meters, orifice flanges and plates. Range size and price list are included on each item. *Trimount Instrument Co.*

9 KLEMP "4 GRATES" a four-page catalog, describes construction of welded grating which incorporates a crested crossbar between bearing bars to provide maximum nonslip characteristics. It is illustrated with latest installation pictures of welded and diamond riveted grating, and four

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Sept. 15, 1952

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types of stair treads. *Klemp Metal Grating Corp.*

10 CRAIGO JOINT ROTOR. A data sheet describes equipment enabling one man standing in one position to stab bits and subs in half the time usually required for making up tools. The joint rotor's telescoping pipe base encloses heavy-duty spring to provide a resilient support for turntable top. *Craigo Supply Co.*

11 REPUBLIC STEEL FIFTIETH ANNIVERSARY booklet traces the history and progress of Steel & Tubes Division established in 1902. Brochure includes illustrations of tubing manufacturing equipment both old and new. *Steel & Tubes Division, Republic Steel Corp.*

12 DURABLA CHECK VALVES, a seven-page bulletin, explains basic check unit for any given nominal pipe size, combined with a standard pipe fitting of predetermined oversize to form a complete check valve. Illustrations are included on reducer and coupling and bushing-type installations, together with packaging and shipping data. *Durabla Manufacturing Co.*

13 BAKER EQUIPMENT NEWS is a 36-page colorfully illustrated brochure containing information on dual-zone completion practices. A section is included on application drawings and explanations of typical dual-zone hookups, as well as a catalog section on Baker retainer production packer and accessory equipment. *Baker Oil Tools, Inc.*

14 BROSITES PROPORTIONING PUMPS, Bulletin No. 15, describes Models No. O and OA "6 in 1" pump designed for laboratory and pilot-plant work in chemical field for metering of free-flowing liquids. Pump is a unit comprised of six separate pumps operated by a common motor of fractional horsepower. *Brosites Machine Co., Inc.*

15 INDIRECT HEATERS is a 39-page, completely illustrated catalog primarily designed to help in selection of most efficient heater for job requirements. Catalog gives complete description of "70" Series and "Junior" indirect heaters, their uses, advantages, construction, capacities and specifications, dimensional drawings, and standard equipment furnished with each model. *Black, Sivalls & Bryson, Inc.*

16 PETROLEUM PRODUCTION EQUIPMENT, a four-page folder, illustrates actual field installations of horizontal and vertical oil and gas separators, indirect horizontal heaters, emulsion treaters, welded oil storage and bolted tanks. *Continental Tank Co.*

17 EXPANSION JOINTS, FLEXIBLE METAL HOSE is an illustrated eight-page catalog which outlines specific usage of Chicago metal-hose types in petroleum processing and handling, gas furnace and tank-settling connections, engine exhaust, and reciprocating connections. Complete specification data are given on most used hose types. *Flexonics Corp.*

18 McKAY OIL-FIELD CHAIN. Informative bulletin covers all types of standard chains, assemblies, and attachments commonly used for rigging, drilling, and materials handling operations in exploration, production, and refining. Specifications and working load data on spinning chains, winch-line end chains, boomer chains, and others are included. *Chain Division, The McKay Co.*

19 WORTHINGTON DDG GAS ENGINES. Four-cycle gas engines of five, six, seven, and eight cylinders are described in eight-page bulletin, which includes pictures and specifications of totally enclosed gas engines designated at Type DDG. They feature 15-in. bore by 17½-in. stroke in 50 and 60-cycle operation. *Worthington Corp.*

20 BULLETIN 157 describes hydrotorque, a remote control hydraulic positioning system designed for extreme accuracy and power, and which can be utilized in a wide variety of applications in industrial, refinery, and chemical industries. *Farris Hydrotorque Corp.*

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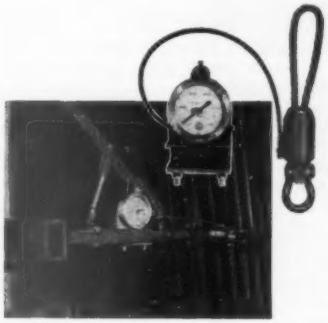
OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

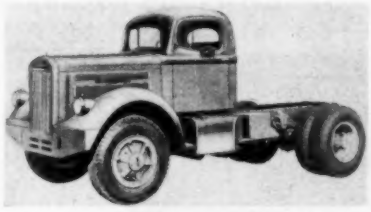
by Dan B. Miller

21 THE MARTIN-DECKER TONG TORQUE GAGE permits control of torque values regardless of operating variables and makes it possible to measure accurately the torque when making up joints with standard tongs. A cylinder has been designed to fit any tong handle so that it can be attached or removed simply and easily without changing clevises or any alteration to the lever. The regular cable, rope, or chain can be connected to the other end of the cylinder. The cable pull is converted to hydraulic pressure through the cylinder for actuating the indicating gage. A bracket is supplied for mounting the indicating gage on the tong lever where it is in direct view of the driller. A maximum cable pull of 15,000 lb. has been provided on the direct reading dial gage. This would be 60,000 ft.-lb. torque when using a 4-ft. lever. A separate pointer has been included for either indicating maximum pull for the joint or for manually setting to the minimum pull to be used by the crew. The piston transformer is designed with a 4 to 1 factor for maximum safety, extra-large bearing surfaces and dust seals for long wear, and carefully machined and polished surfaces for accuracy. *Martin-Decker Corp.*



IT'S NEW ✓ CHECK IT

22 A NEW WHITE PAYLOAD TRACTOR, MODEL WC-24PLT is powered by a White engine producing 180 hp. Design changes in the engine include use of stellite-faced inlet valves; an entirely new exhaust system with dual exhaust and dual inlet to exhaust muffler, increasing horsepower, and improving valve and manifold life. Weight of the tractor ready for the road is under 10,500 lb. including 100 gal. of gasoline, cab, 10.00-20 tires on spoke wheels, fifth wheel. The tractor provides for a bridge formula front axle location with 28-in. dimension from the front of bumper to center of front axle, permitting maximum loading in formula states. It also has 102-in. dimension from front of bumper to back of cab, permitting use of 35-ft. oval-front trailer within the 45-ft. over-all length. The model WC-24PLT is available with 140, 146, and 158-in. wheelbase. It also is available in the same wheelbase with standard two-speed axle. *The White Motor Co.*



IT'S NEW ✓ CHECK IT

23 NEW SIMPLIFIED BRIDGE PLUG. The new explosive-expansion electric wire-line bridge plug, called the Type "B" has no movable parts. It cannot fail mechanically. The new plug can only be set after all safety devices at the surface have been actuated and after the electric wire line has been energized. Control to set the plug is operated from the surface. It is run in the well on the regular electric wire line operated from the service truck. This makes a combination plug back-perforating job a one-setup operation. A prescribed amount of explosives, which is determined by plug size, size and weight of casing, and hydrostatic head, is preloaded in the plug. The plug is lowered to the desired setting location, the safety devices at the surface are actuated, and the explosive force expands the plug sufficiently to

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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lock it tightly in the casing, providing a positive metal-to-metal seal. A strong upward pull on the line releases the setting tool. *McCullough Tool Co.*

IT'S NEW CHECK IT

24 DE LUXE PNEUMAFEED, A SELF-PROPELLED, SELF-POWERED WAGON DRILL. It has the ability to drill in 180° arc at any angle and at a distance of 6 ft. to the rear of the Pneumatractor by means of an extension arm from a vertical centerpost. It is so constructed as to permit drilling horizontally to a distance of 10 ft. above normal ground level and 3 ft. below ground level. When in transit it fits in front of the rear wheel and close to the tractor body permitting free and easy travel. *Schramm, Inc.*

IT'S NEW CHECK IT

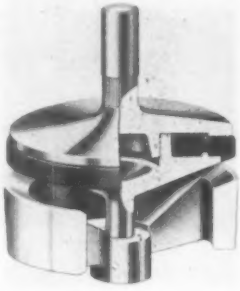
25 MOLDED PLASTIC FITTINGS, including ells, tees, couplings, and reducers, are available either threaded or tapered in sizes from ¾ through 4-in. Of Kraloy composition, which is a variation of Tenite II, these transparent fittings are manufactured from 100 per cent virgin resin. Plastic pipe available in these sizes likewise is transparent, has a tensile strength of 5,400 psi., and a bursting pressure in excess of 460 psi. Wall thickness ranges from about ¼-in. for the 1-in. size to ⅜-in. in the 4-in. Weights range from 18 lb. per 100 ft. for the 1-in. to 142 lb. for the 4-in. Kraloy-O is resistant to most chemicals found in soil, is unaffected by stray ground currents and electrolytic corrosion, and is unharmed by natural gas, crude oil, and oilfield brines. In crude-oil service its smooth walls eliminate problem of paraffin deposition. Installation is fast and inexpensive. *Kraloy Plastic Pipe Co.*

IT'S NEW CHECK IT

26 UNIVERSAL TYPE TUBING STRIPPER. Flex strip stripper rubbers are adapted to engage and seal against any make of tubing head, blowout preventer, or well-head fitting having a bore of from 6⅜ to 7¼-in. This unit can be used to take all the wear of most operations requiring pressure control, and blowout-preventer rams can be held in reserve for emergency. The rubbers are made in three sizes: 2, 2½-in., and a combination size. This combination size may be used with mixed strings, either size string, or it may be worn out on 2-in. tubing and then used on 2½-in. The rubber is held in place by a steel adapter. The universal adapter is made to engage any 7-in. A.P.I. flange, series 4, 6, 9, or 1500 which has either an R-45 or R-46 groove. No modification is required to fit these sizes. The adapter assembly is held down on the existing flange by screwing four of the existing flange stud bolts into threaded holes in the adapter. The assembly extends 2¾ in. above the well head with which it is used. The unit weighs about 60 lb. and can be handled easily by one man. *Petroleum Mechanical Development Co.*

IT'S NEW CHECK IT

27 TYPE HP SLUSH PUMP VALVE gives maximum life with the greatest efficiency of operation. This valve is comprised of three simple parts combined in a functional assembly that is a distinct forward step in slush-pump-valve design. The three component parts are a rugged resilient, all-purpose rubber insert; a hardened steel body that is replaceable; and a hardened steel cap that can be used over and over again. When worn, the rubber inserts are quickly and easily replaced with a wrench. *MacClatchie Manufacturing Co.*

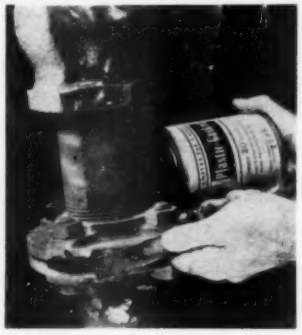


IT'S NEW CHECK IT

28 TRAILER DESIGN PROVIDES SPACIOUS LIVING AND OFFICE QUARTERS. One trailer now does the work of two through a unique half-deck design.

The Lighthouse Duplex trailer provides comfortable, spacious living and office quarters in a single trailer with ample privacy. Ideal for industrial field offices as well as family living, the Duplex has two bedrooms, upstairs, living room, kitchen (with breakfast nook) and complete bathroom downstairs. Over-all height is only 11½ ft. It is equivalent to a 48-ft. trailer home, although it is only 28 ft. in length. Can easily be towed to any field site with no state permits needed. It is designed to provide maximum comfort in all temperatures from the tropics to the coldest regions. These combination office homes-on-wheels are ruggedly built for long service and economical upkeep. *Lighthouse Trailer Co.*

29 VACUUM LINE SEALING PROBLEMS SOLVED. Vacuum line sealing problems are being solved by a new Plastic Gasket material. Users report that, by adding 1/64-in. film or coating to flange faces and gasket surfaces, vacuum line leakage is reduced to a minimum. Any slight leakage which may occur after line has been in service for some time can be corrected without dismantling flanges by simply applying 1/32 in. of Plastic Gasket material around the outside surfaces of the flange where they meet with the gasket. Where flange faces are unmarred and come together true Plastic Gasket material can be used by itself without any other type gasketing material. *Flexrock Co.*

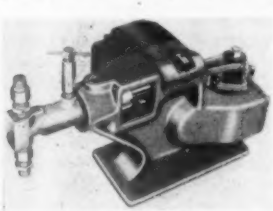


IT'S NEW CHECK IT

30 CRUDE-OIL SYSTEMS FOR INDUSTRIAL ENGINES. The continuous search for greater fuel economy to engine owners has resulted in production of crude-oil systems for the D397, D386, D375, and D364 industrial and electric set Caterpillar engines. Included in the systems are noncorrosive fuel priming pump groups, field transfer pump groups, and fuel-ejector groups. Manufacturer of the fuel systems assume that the fuel will reach the engine in relatively clean, wax-free condition accomplished by means of settling tanks, prefilters, or centrifuging. Where a waxing condition exists, standard engine filters will clog but where waxing condition does not exist, standard engine filters give excellent results. Series 2 lubricating oils, used with crude-oil fuel systems, permit use of any clean crude oil available. Popular applications of the crude-oil systems include pipe-line pumping in which fuel oil is taken directly from the pipe line. Engine owners, although using the crude-oil system, may still use diesel fuel satisfactorily when conditions make utilization of crude oil impractical. *Caterpillar Tractor Co.*

IT'S NEW CHECK IT

31 MODEL X-52 ADJUST-O-FEEDER is designed to provide accurate feeding of chemical solutions for plants where low capacity and medium pressure will meet requirements. The unit is compact and inexpensive having builtin oil-enclosed gear reduction and builtin standard motor eliminating any separate baseplate, gear box, or couplings. Since the crank and connecting rod operate in a horizontal plane, the scale for the micro-stroke adjustment is convenient to read. The standard Model X-52 has an adjustable capacity range of from 1 to 10 g.p.h. discharging against pressures up to 650 psig. A feeding range of from 0.5 to 5 gal. per hour at the same discharge pressure is also available. *% Proportioneers, Inc.%*

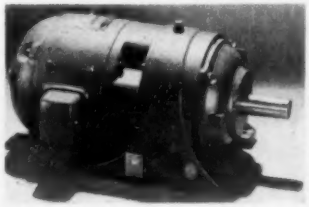


IT'S NEW CHECK IT

32 A NEW HYDRAMOTOR VALVE opens fully in 1 minute even at temperatures of 65° below zero. The new hydramotor hydraulic valve will be available in sizes up to 6 in., with pressure ratings from 2 in. at 600 psi. to 6 in. at 65 psi., with good flow characteristics and a minimum of flow pressure drop. The valve will operate for any flowing medium and will be available either in remote or manually controlled models. In the event of current failure, even in extreme cold, the valve will resume operation within 15 minutes after resumption of current. *General Controls Co.*

IT'S NEW CHECK IT

33 NEWLY DESIGNED THREE-PIECE GEAR MOTOR. A new gear motor, designed to simplify maintenance in case of electrical failure of the stator, is built in three pieces to permit quick and easy removal of defective stators without disturbing gear components or gear connections to the load. Its unique design includes a G-E Tri-Clad motor; a compact, planetary gear; and a mechanical adapter. The gear is available in speed ratings of 780 to 13.5 r.p.m. The mechanical adapter serves the triple function of acting as the pulley end shield for the motor, the motor end shield of the gear housing, and a mechanical spacer for easy accessibility to the stator frame bolts. The new motor is available in ratings of 1 to 75 hp. for standard applications and up to 200 hp. for special applications. *General Electric Co.*



IT'S NEW CHECK IT

34 X-WAX. The product, which is liquid, and is comprised of a mixture of materials, effects a softening, dispersion, and solvent action on the wax accumulations that form in oil-well tubing and which cause impeded and interrupted flow. The well is simply treated with a nominal amount of X-Wax, allowed to stand with only a periodical rocking or surging of solution provided by the oil pump. Besides being used as a restorative treatment of actually "waxed-in" wells, tests show that waxing can be prevented by periodic treatment. It is applied at prevailing temperature without preheating and is safe, noninjurious, efficient, and effective. *Elraco Engineering Co.*

IT'S NEW CHECK IT

PERRAULT

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PIPE LINES

Part of Southern Natural's Big Program O.K.'d by FPC

WASHINGTON.—Southern Natural Gas Co., Birmingham, has been granted temporary authorization of the Federal Power Commission to carry out a part of is $76,000,000 expansion program in the South.

The approved facilities will cost an estimated $5,268,000. They include 88 miles of 24-in. loop lines and about 5 miles of 14-in. loop. The over-all capacity increase on the company's system through construction of this part of the program would be about 40,000,000 cu. ft. daily.

Hearings on the remainder of the program are proceeding after a brief recess. The complete program covers facilities which would increase capacity of Southern Natural's system from the present 670,000,000 cu. ft. to 1,020,000,000 cu. ft. daily. New line and compressor stations would be installed along the company's system in Louisiana, Mississippi, Alabama, Georgia, and South Carolina.

The expansion, in addition to increasing capacity, would hook up new supply sources including Mississippi's Sandy Hook field and several fields along the coast of South Louisiana. This system would be built in the shape of an inverted Y with the base of the Y located at Gwinville, Miss. *(The Oil and Gas Journal, July 21, page 44).*

In another action, the commission granted the company temporary authorization to build a 3,300-hp. compressor station in Logansport field in Louisiana. The $1,021,500 station is required, the company said, because of declining well-head pressures in the field.

Interstate Plans Start in First Quarter on Expansion

SHREVEPORT.—Interstate Oil Pipe Line Co. plans to kick off during the first quarter of next year on construction of crude lines which will increase capacity of its system between the Texas-Louisiana border and Baton Rouge by about 26,000 bbl. daily.

The program involves laying about 15 miles of 18-in. line from a connection with another pipe-line system on the Texas-Louisiana border to a connection with its present Shreveport-Baton Rouge artery near Shreveport. The company also will lay about 137 miles of 22-in. between Shreveport and Baton Rouge to replace sections of multiple 6-in. and dual 12-in. lines now in service. The latter line, with two new pump stations, will increase capacity of the Shreveport-Baton Rouge system from the existing 107,000 bbl. daily to 133,000 bbl. daily.

When the two new stations, one now building at Bunkie, La., are completed, six existing stations now in operation on the line will be abandoned.

Interstate can increase capacity of the system to 160,000 bbl. daily when necessary by replacing a remaining 34 miles of dual 12-in. with a single 22-in. line.

The company has set a third-quarter completion date. Whether it can follow this timetable depends on the action of the Petroleum Administration for Defense, which will rule on allocation of materials for the project.

Conoco's New Rincon Field-Port Isabel Line Completed

HOUSTON.—Continental Pipe Line Co. has completed its 105-mile, 8-in. crude line from Rincon field in Starr County, Tex., to Port Isabel, Tex.

The $2,000,000 line has a capacity of 17,000 bbl. daily. It will serve Rincon field, which now has 192 producing wells.

Contract for construction was let to Western Construction Co., Hobbs, N. M. Completion was accomplished about a month ahead of schedule. Work on the line began in February.

Oklahoma Natural to Lay Gas Line to Industrial Area

TULSA. — Oklahoma Natural Gas Co. will lay a 50-mile 18-in. natural-gas-transmission line from existing facilities at Sapulpa, Okla., to supply gas to a new ammonia fertilizer plant and other industries near Pryor, Okla.

Negotiations for the $2,000,000 line were carried on between Oklahoma Natural, Deere & Co. (builders of the new fertilizer plant), and the Grand River Dam Authority, which supplies the industrial center near the state-owned dam with steam and power.

Joseph Bowes, president of Oklahoma Natural, said the new line will have an ultimate daily delivery capacity of about 75,000,000 cu. ft., of which Deere will use about 6,000,000 cu. ft. Construction operations will begin next spring, Bowes said, and

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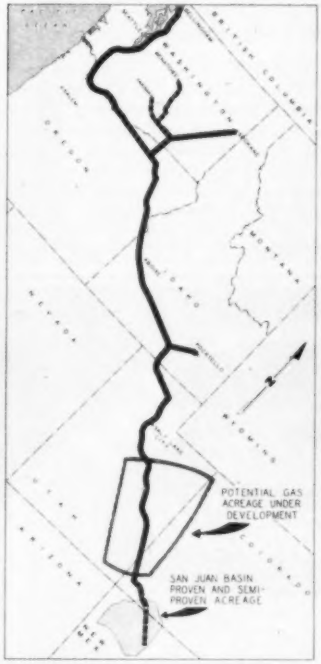
should be completed by early fall next year. Preliminary surveys have already begun.

G.R.D.A. will take delivery of the gas as soon as the line is completed. Deere plans to start commercial production of fertilizer in early 1954.

Texas-New Mexico to Extend Lovington Line 48 Miles

LOVINGTON, N. M.—Texas-New Mexico Pipe Line Co. has revealed plans to extend its recently completed crude line to Lovington in northwestern Lea County another 48 miles.

The main line will be 8-in., with the gathering lines for Saunders, East Caprock Devonian, and Moore Devonian



Still Pitching

On the map is Pacific Northwest Pipeline Corp.'s newest proposal for a big-inch gas line to serve the Pacific Northwest. The company has advanced two other plans for consideration by the Federal Power Commission—both eventually abandoned. However, this is the first plan by the company using San Juan and Uinta basin reserves for supply. This latest proposal, recently filed with FPC, calls for expenditures of $40,000,000 in the next 8 years to develop reserves in the basins and of $130,000,000 to build the line shown. The line initially would move 200,000,000 cu. ft. of gas daily. This would be stepped up in 3 years to 300,000,000 cu. ft. and in 8 years to 750,000,000 cu. ft. (The Oil and Gas Journal, August 25, 1952).

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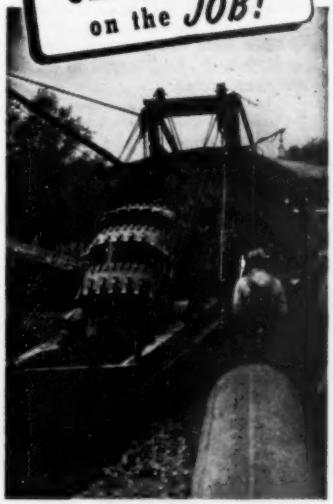

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pools of 4-in. and the discharge lines of 6-in.

Right-of-way now is being acquired, and contractors are to be invited soon to survey the area before submitting bids.

Texas-New Mexico Pipe Line is owned by The Texas Co., Sinclair Oil Corp., Tide Water Associated Oil Co., and Empire Gas & Fuel Co.

Five Pipe-Line Projects Approved for Fast Tax Aid

WASHINGTON.—Accelerated amortization of investment has been approved for five pipe-line projects by the Defense Production Administration.

Certificates have been issued to Malco Pipeline Co., for 40 per cent of $16,000 and 25 per cent of $336,445 for a line in northwestern New Mexico, and to La Gloria Corp., and Brown & Thorpe Drilling Co. for 40 per cent of $9,000 and 25 per cent of $103,700 for a line from Girvan to McCamey, Tex.

Other certificates provided amortization for 25 per cent of $148,315 for Shell Oil Co., for a line from Sewaren to Tremley Point, N. J.; $206,800 for Phillips Pipe Line Co., for a line in West Texas, and $350,010 for Pure Transportation Co., for a line in Andrews and Winkler counties, Texas.

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Hope Natural to Connect New Fields in Two States

WASHINGTON.—The Federal Power Commission has authorized Hope Natural Gas Co., of Clarksburg, W. Va., to lay 33 miles of natural-gas-gathering line in Virginia and West Virginia to hook up new gas-production in Wyoming and McDowell counties, West Virginia, and Buchanan County, Virginia.

The $1,165,080 lines will carry about 20,000,000 cu. ft. of gas daily from Buchanan County gas field, about 5,000,000 cu. ft. from McDowell field, and about 20,000,000 cu. ft. from fields in Wyoming County.

FPC Approves Expansion By Mississippi River Fuel

WASHINGTON.—The Federal Power Commission has issued a series of certificates authorizing Mississippi River Fuel Corp., St. Louis, to increase capacity of its interstate transmission system from 266,000,000 cu. ft. to 450,000,000 cu. ft. daily.

The nine certificates cover acquisition, abandonment, relocation, construction, and operation of facilities—most of which are already in operation pursuant to temporary authorization dating back to 1950.

Total cost of all facilities is $17,757,950. They are located in Louisiana, Arkansas, Missouri, Texas, and Illinois.

Meanwhile, the company said last week it has given up its efforts to gain control of Laclede Gas Co., also of St. Louis. The change in plans, according to William G. Marbury, president of Mississippi, is due to Laclede's recent revelation that it will develop a $10,000,000 underground - storage reservoir at Florissant near St. Louis.

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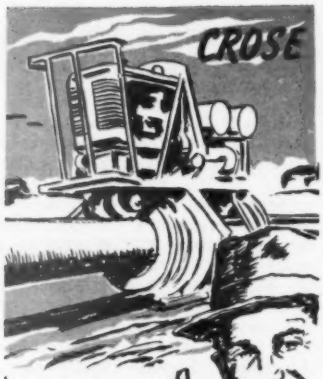

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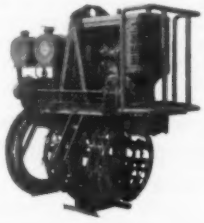

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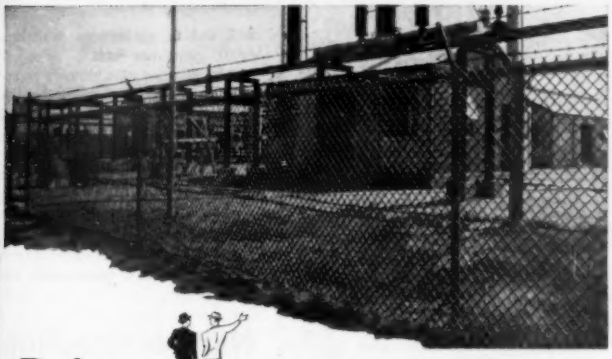

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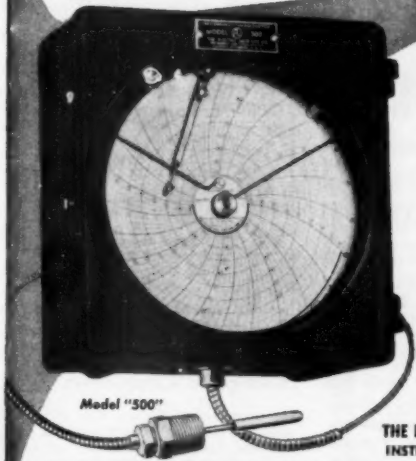

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NATURAL GAS

Second-Quarter Sales Gain 13 Per Cent Over Last Year

NEW YORK.—Revenues of the gas-utility and pipe-line industry from the sales of natural gas to ultimate consumers during the second quarter reached $434,000,000, a gain of more than 13 per cent over sales during the second quarter of 1951.

Revenues from the sale of natural for the 12 months ended June 30, 1952, were $1,810 million—up more than 17 per cent over a year ago, the American Gas Association reports.

Sales scored a smaller gain of about 4.3 per cent, reaching 11,113 million therms. For the 12 months ended June 30, sales climbed more than 10 per cent to reach 46,530 million therms.

Customers served with natural gas reached 18.1 million. This is about 71.2 per cent of all gas customers. A year ago at this time, there were 15.594 million natural-gas customers comprising 63.7 per cent of the total. The big change in just 1 year reflects the continuing trend toward conversions from manufactured and mixed gas to natural. This year these occurred principally in the upper New York State, New York metropolitan, and New England areas.

Sales of natural for July totaled 2,955 million therms, up almost 3 per cent over the figure in July 1951. For the 12 months ended July 31, sales totaled 46,612 million therms, a gain of about 9½ per cent.

Texas Group Said Seeking Minimum Well-Head Price

HOUSTON.—Independent producers and royalty owners in Texas are working for a state law setting minimum well-head prices for natural gas due to a lower court's action in invalidating Texas' natural-gas-gathering tax.

This was reported to stockholders of Western Natural Gas Co. at Houston by Paul Kayser, president of Western and of El Paso Natural Gas Co.

Kayser said Western would benefit from such legislation but would not work for it, because company officials did not believe in abrogation of contracts by law. Old purchase contracts now are being revamped by gas-transmission firms on their own initiative, he said.

He said that the independent producer-royalty owner group probably will ask a minimum well-head price of 10 cents per M.c.f.

Meanwhile, complete figures on July collections of the gas-gathering tax in the state showed a sharp jump in amounts protested. Of the total $967,944.76, a record $869,546.41 was paid under protest by 107 companies and individuals. El Paso is now the only major company not protesting the tax. Two others, United Gas Pipe Line Co. and Tennessee Gas Transmission Co., joined the list of protestants in July.

Natural Gasoline

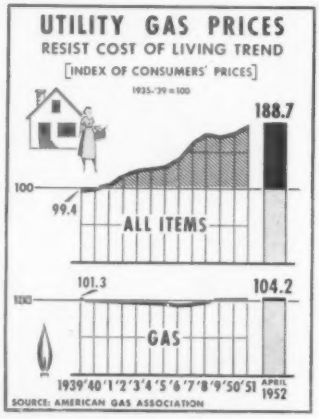
Amerada Reveals Plans for Big Williston Basin Plant

NEW YORK.—Albert Jacobsen president of Amerada Petroleum Co., revealed last week that Amerada will build a multimillion-dollar combination natural-gasoline and sulfur-extraction plant to process gas purchased from its Williston basin oil properties.

Jacobsen said the proposed plant will cost between $10,000,000 and $20,000,000 and will be located as close as possible to center of the producing area. Its exact size and location will not be determined until Amerada can make a reasonably accurate estimate of the extent of its reserves in the area.

The company's holdings cover some 400,000 acres, including the Beaver Lodge and Tioga fields in North Dakota. Gas produced along with the oil in its producing properties now is being flared.

Negotiations with gas transmission and utility companies will start, Jacobsen said, when more information is available on the quantity of natural gas on hand. Amerada already has been approached by several such firms.



Savings to Consumers

The average cost of gas service to residential customers rose less than 5 per cent between 1939 and April 1952, while the cost of living (measured by the consumer's price index of the Bureau of Labor Statistics) climbed almost 90 per cent. This stability in gas-service prices was maintained despite sharply increased costs to gas companies for labor, materials, equipment, and taxes.

Honolulu, Signal Under Way On New Plant in Ropes Pool

LEVELLAND, Tex.—Honolulu Oil Corp. and Signal Oil & Gas Co. are starting construction immediately of a new natural-gasoline plant in the Ropes area of southeastern Hockley County, Texas.

The plant, which will be erected about 4 miles north of Ropesville, will have an initial processing capacity of from 1,000,000 to 1,500,000 cu. ft. of gas daily. It will be operated by Honolulu and will handle gas produced from 14 Pennsylvanian producers in Ropes pool.

Contract for construction has been let to Hudson Engineering Co., Houston. Completion has been set for December 1 of this year.

The new plant will be one of the first in the Permian basin to employ a refrigeration process. Most of the plants in this area use an absorption process.

Natural-gasoline and L.P.G. produced by the plant will be consumed in the immediate vicinity. Capacity can be expanded as new wells are completed in the area.

Magnolia Operating Its New Edinburg Processing Plant

HOUSTON.—Magnolia Petroleum Co.'s new gas-processing plant in Edinburg field of Hidalgo County, South Texas, has been placed in operation.

The plant is processing gas at a daily rate of about 8,500,000 cu. ft. Its capacity is about 10,000,000 cu. ft.

About 150 bbl. of product is being recovered daily and trucked to the Taylor Oil & Gas Co.-Mayfair Minerals, Inc., cycling plant at McAllen, Tex.

Stripped gas is being taken by Tennessee Gas Transmission Co.

Reports have it that a pope line will be laid between the new installation and the Taylor-Mayfair plant.

REFINING

PAD Approves Construction Of New Refinery at Mandan

WASHINGTON. — The Petroleum Administration for Defense has recommended that the projected new refinery in the Mandan-Bismarck area of North Dakota planned by Standard Oil Co. (Ind.) be approved for accelerated amortization of investment and allocated a total of 6,728 tons of steel.

Initial capacity of the refinery is planned at 15,000 bbl. daily.

The company recently filed a registration statement here with the Securities and Exchange Commission for an issue of nearly $140,000,000 in 30-year debentures. About $81,500,000 would be used to pay off bank loans, the remainder would be used for working capital and for construction of new facilities. The latter would include the Mandan installation and a products pipe line to connect the refinery with the company's northwest pipe line in the Fargo-Moorhead, N. D., area.

Combination Gum Inhibitor, Sweetening Agent Described

KINGSPORT, Tenn.—A combination gum inhibitor and sour-gasoline sweetening agent, "Tenamene 2," is described in a bulletin released recently by Tennessee Eastman Co.

In the presence of caustic and air, this compound appears to act as an oxidation catalyst, converting mercaptans in sour gasoline to disulfides.

Left unchanged by this sweetening action, the additive remains in the gasoline to inhibit later gum formation.

Many refiners, says Eastman, are augmenting mercaptan-removal operations with the use of Tenamene 2. Since it is seldom feasible to obtain a doctor-sweet gasoline by mercaptan-removal operations alone, it has become common practice to use doctor or copper treating to finish the sweetening operation.

In many cases, say Eastman engineers, refiners can eliminate such treating by merely adding Tenamene 2 to the slightly sour effluent from the mercaptan-removal unit. This eliminates the danger of free sulfur and copper contamination, and side-steps the corrosion problem involved with copper treating.

Eastman's bulletin discusses in general, the applications of the inhibitor sweetener and its limitations. A recommended procedure is outlined for testing gasoline stocks for arriving at optimum use of the additive. The bulletin is distributed by Tennessee Eastman Co., Chemical Sales Division, Kingsport, Tenn.

10-Week Strike Ends at Frontier's Cheyenne Plant

CHEYENNE, Wyo.—A strike lasting 10 weeks at Frontier Refining Co.'s 12,000-bbl. plant here is over.

The announcement was made by representatives of the company and Local 574 of the Oil Workers International Union.

Principal points at issue were reported to be the work scheduled and discharge clauses in the contract. The company had offered wage increases of 15 cents per hour and shift differentials of 6 and 12 cents an hour for evening and graveyard shifts. The offer also included a $50 payment in lieu of retroactive pay increases prior to the walkout.

The new agreement provides a no-strike clause in effect until June 1, 1953, and a profit-sharing plan, for which the details are yet to be worked out. The refinery was kept in operation through the strike by supervisory employes. The strike was voted June 1, but workers did not walk out until later in the month.

Refining Dividends So Far Top All Other Industries

WASHINGTON.—Publicly reported cash-dividend payments of oil-refining corporations in July were $7,600,000 compared with $8,700,000 in the same month last year, the Department of Commerce reported last week.

For the first 7 months of the year, however, dividends aggregated $483,000,000, compared with $404,700,000 in the corresponding 1951 period. The department pointed out that the gains of $78,000,000 and 19 per cent were the largest dollar and percentage increases reported by any manufacturing industry.

Federal Oil Taxes Up 40 Per Cent Over Last Year

WASHINGTON.—Treasury revenue from the four federal oil taxes this year is running better than 40 per cent ahead of 1951.

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Revenue Bureau reported last week, income from these taxes amounted to $549,857,484 against $384,430,458 in the corresponding period last year.

The bulk of the increase has been from gasoline, which returned $459,973,517 against $317,998,608 last year, but receipts from lubricating oils rose to $60,856,744 from $50,404,340 and from pipe-line transportation to $20,479,936 from $16,027,510. Revenue of $8,547,287 was secured from the new tax on diesel oil.

For the month of August, collections ran $40,624,000 above the same month in 1951, with gasoline receipts of $82,325,642 against $47,739,146, lubricating oil $7,101,513 against $5,833,862, pipe-line transportation $5,524,110 against $2,133,841, and diesel oil $1,409,487.

Test-Results Check Near

WASHINGTON. — Samples of an SAE 30 heavy-duty motor oil are being forwarded to about 77 laboratories participating in the cooperative-testing program of the National Petroleum Association.

The labs will run about 22 tests on each sample of motor oil and will forward their findings to the N.P.A. office here to be tabulated. Each lab then is advised as to how its test results check out with the others. Identity of the participants is not revealed in the reports.

The necessary samples will be supplied and shipped by Wolf's Head Oil Refining Co. of Oil City, Pa.

Refining Briefs

The American Petroleum Institute's Division of Marketing has announced that a 16-page booklet explaining the new service classifications of lubricating oils, will be available by mid-September. Sample copies are free.

Northwest Airlines has become the first to use the new detergent additive, tricresyl phosphate in its avgas. Its 10 Boeing Stratocruisers are now supplied with the new lead byproduct neutralizer by Shell Oil Co., which is blending the additive into 108/130 and 100/115 grades of avgas.

Davison Chemical Corp.'s new catalyst plant at Lake Charles, La., will be opened on schedule about the first of the year. Davison officials said last week the plant would be placed in operation at about that time despite delays in construction due to the steel strike.

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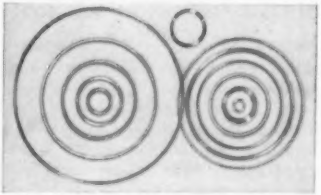

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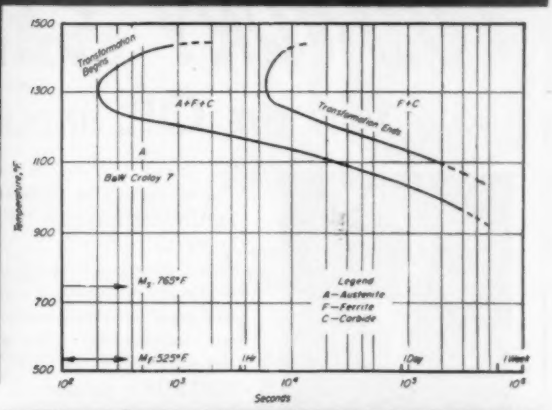
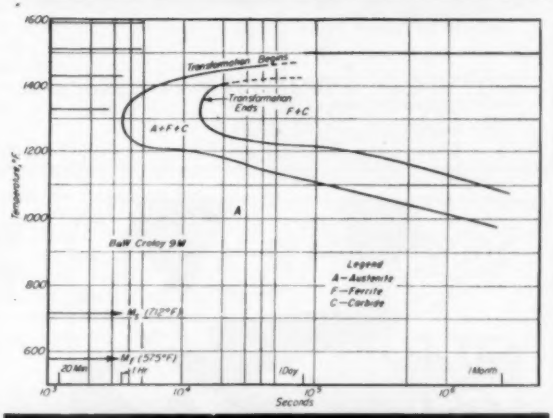


TTT Curve for B&W Croloy 7. Austenitized 40 min. at 1860 F. As-quenched grain size, A.S.T.M. No. 4 to 5.



TTT Curve for B&W Croloy 9 M. Austenitized 40 min. at 1860 F. As-quenched grain size, A.S.T.M. No. 4 to 5.

Finding new facts about the behavior of alloy, stainless, and carbon steel tubing to help users with application and installation problems is a regular major function of the B&W Technical Service. For example:

Isothermal transformation data recently were made available for the first time on B&W Croloy 7 and B&W Croloy 9 tubing. Extensive research and tests on these two popular intermediate alloys for high-temperature services provided sufficient data to construct the time - temperature - transformation diagrams reproduced on the opposite page. They furnish helpful information relating to the heat treatment, general fabricating and welding, and particularly the hardenability of these tubing steels.

A technical report TR 520 covering the TTT tests and findings is yours for the asking.

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Drilling Contractors

Active Rotary Rigs Gain 100 During Past Month

The number of active rotary rigs in the United States and western Canada continued to increase during the week ended September 8, boosting the total to 2,577, the greatest number since the latter part of July. There now are more than 100 rigs running than a month ago when the total dropped to the lowest level recorded since April 1951. Active operations were up during the past week in nearly all areas, declines being reported only in West Texas and on the Pacific Coast. In the Rocky Mountain region the number climbed to a new all-time record of 260 active rigs.

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area—	Week ended 9-8-52	Change week ended 9-1-52	Change week ended 9-10-51
Gulf Coast	512	+27	− 96
N. & W. Tex.-N. M.	724	−20	−272
Ark.-N. La.-E. Tex.	138	+ 5	− 37
Oklahoma	311	+ 9	+ 6
Kansas-S. Nebraska	157	+11	− 22
Illinois-Eastern	150	+15	+ 1
Rocky Mtns.	260	+10	+ 73
Pacific Coast	155	− 2	− 29
Total U. S.	2,407	+55	−376
Western Canada	170	+ 4	+ 13
Total	2,577	+59	−363

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Pacific Coast and Illinois-Eastern areas are shown on pages 180 and 181.

J. D. Sprecher, Casper, Wyo., is contractor on a new wildcat operation which Shell Oil Co. is undertaking in the Southwest Richey area, in McCone County, Montana. The new operation is designated as 21-33 NP with location in the C NE NW 33-22n-48e.

Nebraska Drillers, Inc., Denver, has the contract for a wildcat test which James P. Sloss is starting at 1 State, in the SE SE SE 36-14n-55w, 6 miles southeast of Kimball, in Kimball County, in the southwestern corner of Nebraska. Location is about 3 miles northeast of the Enders field.

Sterling Drilling Co., Sterling, Kans., has contracted with Canada Southern Oils, Inc., a Canadian company for a wildcat test to be drilled in southwestern Phillips County, in northeastern Colorado. The test, 1 Leonard, will be the Canadian company's first in the Rocky Mountain region. Location is in the C NE NE 26-6n-46w.

Coulston Drilling Co., Gladewater, Tex., is nearing contract depth of 6,500 ft. at a wildcat test it is drilling for B. F. Phillips, Sr., in the Mineola area, Wood County, East Texas. The test is at 1 Dabney White, in the T. J. Griffin Survey.

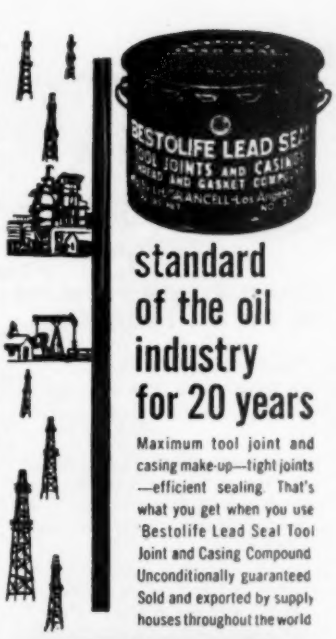
Justiss-Mears Drilling Co., Jena, La., is contracted to drill a 5,000-ft. Wilcox test for Amerada Petroleum Corp. in the Sherwood area of Catahoula Parish, Louisiana. Location is for 1 Louisiana Central Minerals Co., in the C NW SW 11-10n-5e, a mile east of the town of Sherwood.

Penrod Drilling Co., Shreveport, contracting for its affiliated Hunt Oil Co., now has two rigs running in the Big Bayou area, southwestern Catahoula Parish, Louisiana, where production recently has been opened in the Wilcox formation around 5,500 ft. Current operations, Nos. 71 and 72 Louisiana Delta, both in 20-6n-5e, are the first two confirmation tests for the discovery.

Trident Drilling Co., Ltd., Calgary, Alta., has set up a new rotary rig for Richfield Oil Corp. in the Edson area of western Alberta, Canada. The new operation, located 125 miles west of Edmonton, in LSD 10, 33-51-19w5, is Richfield's first in Canada. It is being drilled jointly with Hudson's Bay Oil & Gas Co.

Canbridge Corp., Ltd., Calgary, Alta., has the contract for a wildcat test which Phillips Petroleum Co. and Husky Oil & Refining, Ltd., are startin gas a joint venture at 1 Josephine, LSD 1, 23-24-29w3, 3½ miles east of the Alberta line in Saskatchewan Province.

Overland Drilling Co., Ltd., is the contractor on 4,000-ft. test being drilled by a group of independent Canadian companies in Turtle Mountain Forest Reserve, 4 miles north of the United States border, in the Mani-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toba sector of the Williston basin. Operators include Western Homestead Oils, Ltd., British Empire Oil Co., Ltd., Long Island Petroleums, Ltd., New Ranchmens Oil Co., Ltd., and West Territories Oils, Ltd.

Lloyd Petroleum Drillers, Ltd., Saskatoon, Sask., is contractor on the first of a series of 14 wells which Franco Oils, Ltd., has planned to drill in the Lone Rock sector of the Lloydminster heavy oil-producing region on the Saskatchewan-Alberta line, in western Canada.

General Petroleums of Canada, Ltd., Calgary, has been awarded the contract for another wildcat test which Texaco Exploration Co. has projected for the Rich Valley area, 40 miles northwest of Edmonton, Alta. Location, in LSD 6, 28-56-3w5, is 6 miles northeast of the above operator's 1-A Glenevis, a new Madison lime oil discovery well.

Commonwealth Drilling Co., Ltd., Calgary, is moving its rig from a recently abandoned wildcat drilled for Tide Water Associated Oil Co. and associates to another wildcat location in southwestern Saskatchewan where it will drill a joint test for Imperial Oil, Ltd., and Tide Water. The new location, in LSD 6, 10-3-18w3, is 2 miles southeast of Climax, 14 miles north of the United States border.

Fleet Drilling Co., Ada, Okla., is drilling on a new contract it has with Jay Simmons of Dallas for a deep test located south of the newly developing East Washington field, 9 miles northwest of Purcell, in McClain County, Oklahoma. The test, located in the NE NE NE 15-7n-3w, is scheduled to go to 10,200 ft., where it will take in the lower Simpson pay zones of the East Washington field.

Milton Crow, Inc., Shreveport, has the contract for a new eastern Union County, Arkansas, wildcat test which McAlester Fuel Co. is starting at 1-H Crossett, in 31-18s-10w. Objective is the Smackover lime, expected at 6,200 ft.

Parker Drilling Co. of Canada, Ltd., Calgary, is the contractor on Texaco Exploration Co. and Socony-Vacuum Exploration Co.'s second test in the Pigeon Hills area of Central Alberta. The new joint wildcat venture, 1-A Pigeon Hills, in LSD 16, 2-4s-1w5, is 6 miles northwest of the Bonnie Glen Devonian oil field and about the same distance west of the Wizard Lake Devonian field.

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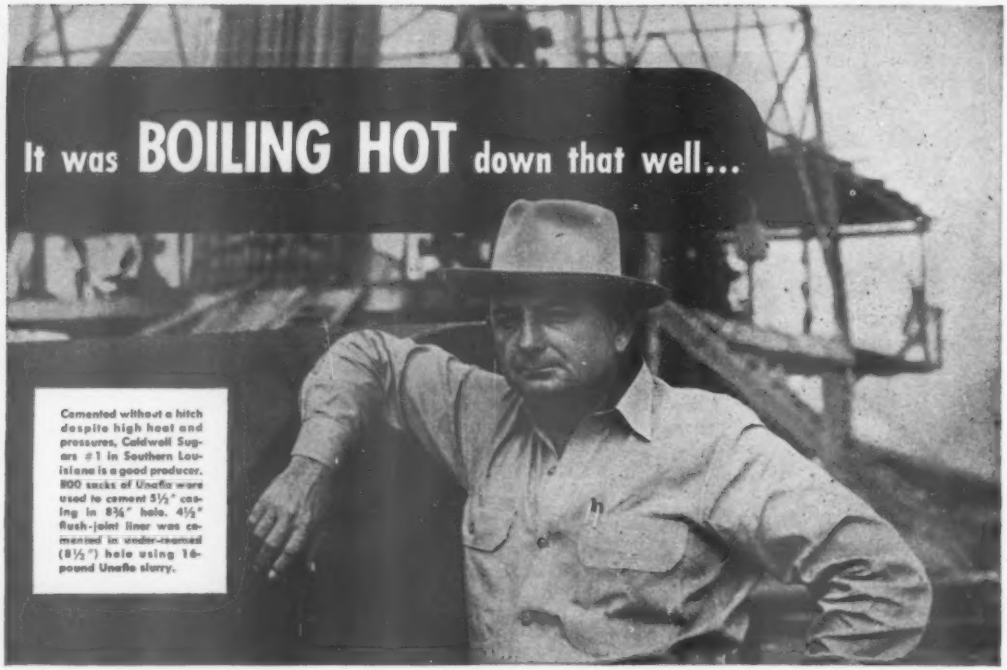
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Developments Northwest of Edmonton

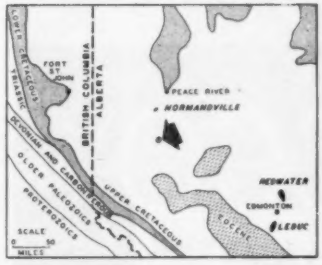
THE discovery of an oil-bearing reef about halfway between Edmonton, Alta., and Fort St. John, B. C., has heightened interest in a wildcat area of tremendous size.

Amerada Petroleum Corp.'s Sturgeon Lake wildcat, located 180 miles northwest of the Edmonton reef area, found about 90 ft. of upper Devonian reef saturated with 35°-gravity crude oil. The indicated discovery, arrowed on sketch, topped the reef at 8,914 ft. A drill-stem test at 8,955-85 ft. flowed oil for 30 minutes before being shut in. A test at 8,985-9,015 ft., total depth, recovered 2,250 ft. of crude oil and 4,325 ft. of salt water to indicate that the oil-water contact is at about 9,000 ft.

The new discovery is less than 1 mile south of an Amerada wildcat which was completed dry at 10,278 ft. last March. The wildcat to the north found thick Devonian reef loaded with water. Top of the reef in that hole has since been shown to have been more thna 250 ft. lower than in the new discovery. Apparently Amerada's well is on a reef buildup similar to those found in the Edmonton area in contrast to the type of upper Devonian reef limestone found at Normandville, 45 miles to the north. There the discovery well had only 25 ft. of saturated porosity from 6,725 ft.

On to the north and northwest of the new discovery is the Peace River region (that area along the Peace River between Fort St. John and the community of Peace River). Unlike the Edmonton area, where the lower Cretaceous sediments lie directly on Devonian rocks, the Peace River region has Carboniferous (Mississippian and Pennsylvanian), Permian, and Triassic rocks. All of this section, found in the foothills, wedges out abruptly to the east. In addition to these attractive wedgeouts the area offers a change from continental to marine facies within the Lower Cretaceous sediments.

In the Alberta portion of the Peace River area the discovery of gas dates back to 1923. However, it has been



only in the last 3 or 4 years that development in this area has become significant. Proven gas reserves are estimated at more than ½ trillion cubic feet. Two wildcats found oil in Triassic rocks.

Over in the British Columbia portion of the Peace River area in the immediate vicinity of Fort St. John townsite, wildcat drilling appears to have assured major gas fields and there are growing indications that sizable oil fields may also be in the making.

The first indicated discovery of oil in northeast British Columbia was made last November. The wildcat recovered 900 ft. of oil and 480 ft. of salt water on a 90-minute drill-stem test of Permo-Pennsylvanian dolomite. Following the completion of a shallow dry hole about 6½ miles to the southwest of the indicated discovery, Pacific Petroleums, Ltd., et al moved northward from the initial discovery to drill a series of wildcats with some seismic background. There are now eight wells across a 13-mile stretch which have found gas in several zones of the Lower Cretaceous to Pennsylvanian section. Four of the wells have also indicated light crude discoveries.

The best gas well to date, nearly 3 miles north of the first discovery, flowed at rates of 10 M.M.c.f. daily with small recoveries of distillate from the Permo-Pennsylvanian at 6,300 ft. The most promising indicated oil discovery is at the northwest end of the area being tested. It recovered 1,380 ft. of 40°-gravity oil and no water from a thin zone of porosity in the Upper Triassic.

Geologically the Peace River region offers what appears to be ideal oil country. Now that Devonian reef has been found between it and the big reef area to the southeast it looks as though another wave of exciting discoveries may be developing in western Canada.

Philip C. Ingalls

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

MANITOBA . . . Just 2 miles north of the Bottineau County, North Dakota, line The California Standard Co. is swabbing oil-cut mud and water at their 9-13 Waskeda on LSD 9, 13-1-26 WIR. The operator tested 60 ft. of oil and gas-cut mud from the zone 3,005-35 ft. and 200 ft. of oil and gas-cut mud and 300 ft. of mud-cut oil with 100 ft. of water-cut oil from 3,035-65 ft.

NORTH DAKOTA . . . Amerada Petroleum Corp. has completed 1 North Dakota "D," Charlson area wildcat between the Croff and Beaver Lodge fields. The well, the fourth oil discovery for the state, was completed for 127 bbl. of 39.8°-gravity oil with 131 bbl. of water through ½-in. choke.

UTAH . . . Carter Oil Co. has logged more slight oil shows at 1 Elmer Moon, C SW SE 8-4s-3w (USM), in the Antelope area of Duchesne County. The wildcat has had shows of gas and oil from 2,580 ft. to present depth of 7,378 ft. Operator is drilling ahead.

MONTANA . . . The Texas Co. completed 1 Northern Pacific "G" (NCT 4), wildcat 14 miles northwest of the Cedar Creek discovery well in Dawson County. Completion followed extensive tests and acid treatment with initial of 191 bbl. of oil daily from the Devonian (?) reported.

California

Edison Area Wildcat Completed For Light Oil

LOS ANGELES.—General Petroleum Corp. has completed a good light oil discovery well in the Edison area southeast of Bakersfield. Located 1½ miles north of Edison production and 1 mile southwest of Race Track Hill, the wildcat was completed flowing at the rate of 500 bbl. daily from 16 ft. of perforations at 5,322-38 ft.

The new pool discovery, 42-9 Graham-B in NE NW 9-30s-29e, was in a lower sand of the Jewett-Vedder group. Drilled to 6,395 ft. the wildcat had 7-in. casing set at 5,393 ft. Following the initial test, made on a 16/64-in. bean, a 10/64-in. choke was used and production cut back to 200 bbl. daily. Gravity of the crude was 41.6°. The flow was accompanied by a negligible amount of water and 147 M.c.f. of gas.

The south offset to Superior Oil Co.'s recent Pliocene sand discovery at Lost Hills found the pay about 150 ft. higher than did the discovery and halted drilling to set pipe. The offset, Universal Consolidated Oil Co.'s 101 "well" in NW SW 18-26s-21e, was drilled to 2,805 ft. and casing was set at 2,728 ft. The north offset, Superior 2 Lost Hills, was drilling and coring below 4,000 ft. on a formation test at 3,059-81 ft., however, about 1,900 ft. of free oil was recovered so that a producer seemed assured. Tide Water Associated Oil Co., was preparing to start 83 "well" as a west offset to 2 Lost Hills. Since General Petroleum Corp. and Richfield Oil Corp. have holdings north of Tide Water's they probably also will shortly start extensioners.

Another San Joaquin Valley development was the starting of a wildcat on the northwest edge of Buena Vista Hills production and 2½ miles northwest of nearest Antelope pool producers. The new test, Golden Bear Oil Co. 1 Chelmsford in SW SE 17-31s-23e, will seek the stratigraphic equivalent of the Stevens zone.

This new pay, discovered last March by Standard of California in 9-32-24e, now has four producers at the ends of a 6-mile northwest trend. First classified as Stevens production, the pool has been renamed Antelope.

In the Los Angeles region a development was the completion of a new pool discovery by Union Oil Co. Its 2-47 Horse Meadows in 4-2n-16w, 1¼ miles south of Aliso Canyon production, was completed for 75 bbl. daily of 26°-gravity crude, cut 35 per cent. Drilled to 6,696 ft., the wildcat was plugged back to 4,669 ft. and 5-in. liner landed at 4,610 ft.

Four new wildcats were preparing to start or were announced for early drilling in the gas producing area north of San Francisco. Richfield Oil Corp. staked 3 Buttes Community-A in 33-16n-2e, about 2½ miles northeast of its recent 3,100-ft. gas discovery in Sutter County. In Glenn County, Honolulu Oil Corp. staken an extension to the Willows field in 7-20n-2w, its 1 Honolulu-Union-Brazos. In the Alta Mesa area of Sacramento County, H. L. Alexander was preparing to start 1 C. W. Bottimore, a 3,000-ft. test in 3-6n-7e. The fourth wildcat was Humble Oil & Refining Co. 1 Belle Fletcher in 26-16n-1w, Colusa County.

CALIFORNIA WILDCAT FAILURES

Butte County, Wild Goose area: Honolulu Oil Corp. 1 Quigley, 17-17n-1e, dry, TD 3,559 ft., elev. 68 ft.

Kern County, Arvin area: Arvin Associates 66A Hanson Comm., 26-31s-29e, dry, TD 7,832 ft.

Goosloo area: The Texas Co. 1 KCL-Goosloo South, 8-30s-25e, dry, TD 9,511 ft., elev. 313 ft.

South Hill area: The Texas Co. 1 Reserve-Tejon, 5-10n-18w, dry, TD 3,541 ft., elev. 1,010 ft.

Los Angeles County, Calabasas area: Fidroeff-Jordan Oil Co. 1 Denzinger, 6-1s-17w, dry, TD 1,307 ft., elev. 898 ft.

Madera County, Chowchilla area: Sunray Oil Corp. 1 Sunray - Honolulu - Chowchilla Farms, 23-11s-14e, dry, TD 3,980 ft., elev. 158 ft.

Madera area: Enterprise Oil Co. 1 Hay, 19-10s-18e, dry, TD 1,790 ft., elev. 315 ft.

San Luis Obispo County, Russell Ranch: Richfield Oil Corp. 68-23 Sloan c, 23-11n-28w, dry, TD 4,155 ft., elev. 1,591 ft.

Santa Barbara County, Bradley Canyon area: General Pet. Corp. 45-9 Nicholson, 9-9n-33w, dry, TD 7,932 ft., elev. 686 ft.

Capitan area: Christopher Oil Co. 1 Gila, 34-5n-30w, dry, Sespe 1,960 ft., TD 3,515 ft., elev. 185 ft.

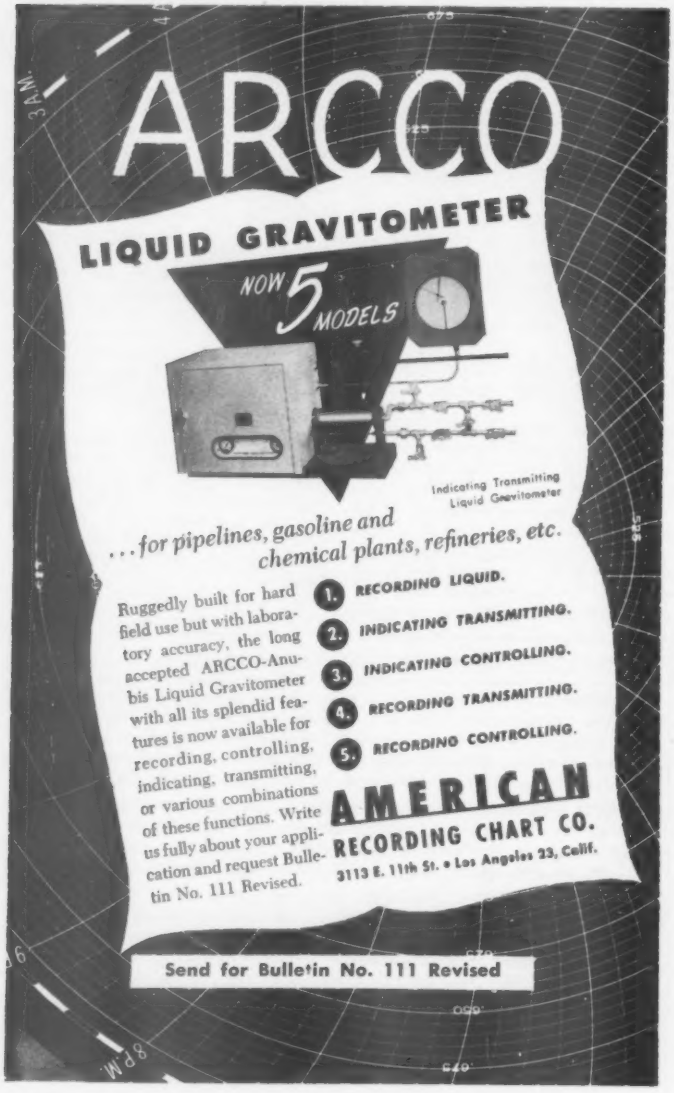
Tepusquet area: British American 1 British Amer.-Honolulu-Rancho Suey C, 5-10n-32w, dry, TD 4,004 ft., elev. 2,241 ft.

Tehama County, Orland area: G. T. Cameron 4-1 Orland Comm., 19-23n-2w, dry, TD 3,411 ft., elev. 230 ft.

Ventura County, Timber Canyon area: Richfield Oil Corp. 13 E. P. Clark, 18-4n-20w, dry, TD 3,485 ft., elev. 2,675 ft.

CALIFORNIA SUCCESSFUL WILDCAT

Kern County, southwest extension to Wheeler Ridge Eocene pool: Richfield Oil Corp. 76-29 KCL-D, NE SE 29-11n-20w, flowed 1,900 bbl. per day through per-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Louisiana-Ark.

Additional Pay Section Opened in Bossier Strike

SHREVEPORT.—Carter Oil Co.'s 1 Crystal Oil & Refining Co., in the SW NE 33-21n-11w, Bossier Parish, tested 68 bbl. of 47.4°-gravity condensate in 17 hours through 5/8-in. top and ½-in. bottom chokes from the Taylor through perforations 9,716-20 ft. Gas-condensate ratio was 11,640:1. More Taylor pay section was opened from perforations 9,706-16 ft. after pulling tool. Operator is continuing to test with the hole bottomed at 9,817 ft., cased to 9,775 ft. Completion will be made in the Taylor sand of the Cotton Valley.

Production casing has been cemented at Glasscock Drilling Co. and W. L. Edwards wildcat 1 Gillis heirs estate, in the C SE SE 17-8n-7e, eastern Catahoula Parish. A good show of oil was found in the Wilcox sand. The nearest producing area is at Pool Lake field, 2 miles east.

The show of oil was found from 4,536-61 ft. in the Wilcox, revealed by log and side wall samples. Total depth of the hole is 6,222 ft., hole plugged back to 4,636 ft., and 5½-in. pipe set at 4,614 ft.

Sinclair Oil & Gas Co. is still testing at 2 Hogue-Esperance, indicated new Wilcox discovery 1 mile southwest of Esperance Point field in eastern Concordia Parish. The well flowed oil at the rate of 64 bbl. in 18 hours. Location is in Section 8-5n-9e. Production is from Campbell sand perforations at 6,362-65 ft.

A difference in water levels from this wildcat and Esperance Point field wells indicated the possibility of separate reservoirs, although the well is producing from the same sand interval productive at Esperance Point.

Arkansas—A 1-hour and 40-minute drill-stem test from 2,940-58 ft., indicated Tokio pay for Fouke field, Miller County, at Carter Oil Co. 18 W. P. Sturgis, NW NE NE 1-17s-27w. Operator is coring at 3,567 ft. for Paluxy, which is the productive zone in Fouke field. Recovery on the test was 2,940 ft. of 21°-gravity oil, believed to be in the Tokio sand.

Jay Simmons is waiting for tanks before continuing to test at 1 S. G. Dildy, C N½ SW NW 21-17s-26w, new Paluxy oil discovery in Miller County. The well flowed 245 bbl. of 38°-gravity oil in 14½ hours from open hole 4,302-06 ft.

LOUISIANA WILDCAT FAILURES

Bossier Parish: McAlester Fuel Co. 1 Hodges "A," C SW NE 32-16n-11w, dry, TD 4,592 ft.

Catahoula Parish: Amerada Petroleum Corp. 1 Louisiana Central Lumber Co., C NW SW 11-10n-5e, dry, TD 5,062 ft.

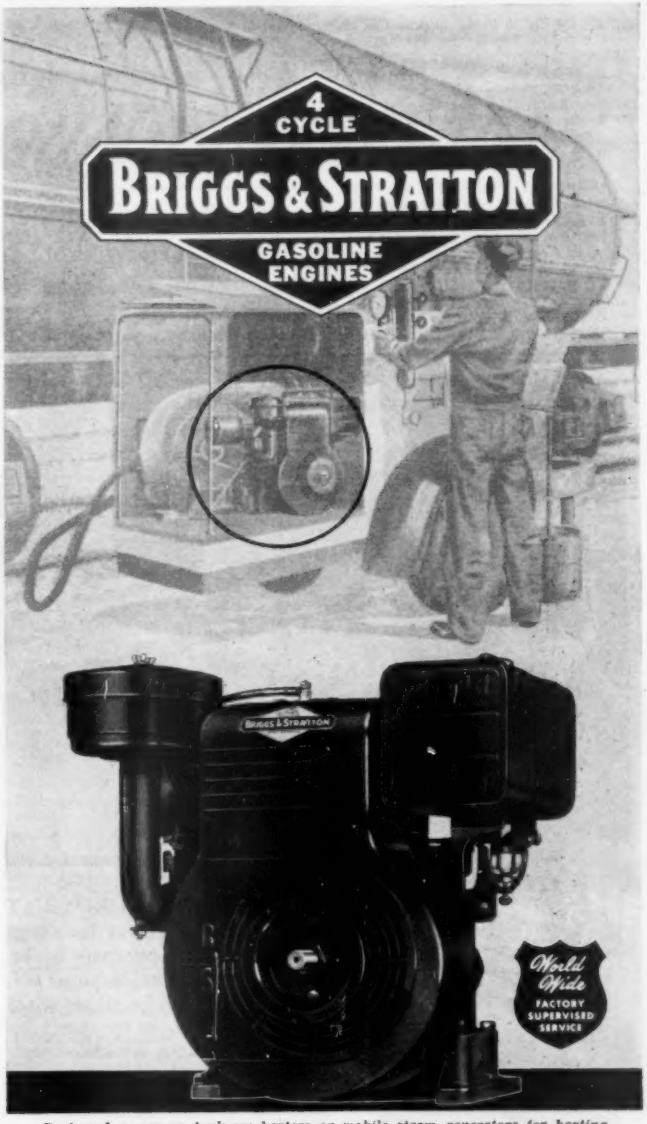
Barnett Serio et al 1 Louisiana Central Mineral Co., C SW SE SE 13-10n-5e, dry, TD 5,807 ft.

Justiss-Mears Oil Co. 2 Harmon, C NW NW 10-8n-7e, dry, TD 6,020 ft.

Bering Oil Co. 1 Perrin, 1,120 ft. S and 1,580 ft. E of NWc 41-7n-5e, dry, TD 5,200 ft.

Claiborne Parish: Magnolia Petroleum Co. 1 Kelly, C SW NE SW 12-23n-4w, dry, TD 3,550 ft.

Concordia Parish: Hunt Oil Co. and Gulf



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Refining Co. 18 Fisher Lumber Co. "E," C NE SE 32-7n-9e, dry, TD 7,015 ft.
Barnett Serio et al 1 S. L. Winston, 660 ft. N and E of SWc 36-7n-9e, dry, TD 6,808 ft.
De Soto Parish: Lee Spencer et al 1 E. B. Porter "A," 194 ft. S and 649 ft. W NEc SW SE 23-12n-13w, dry, TD 1,134 ft.

ARKANSAS WILDCAT FAILURES

Columbia County: McAlester Fuel Co. 1 Foster-Grayson "A," 660 ft. N and E SWc SW SE 3-19s-20w, dry, TD 5,285 ft.
Crittenden County: J. K. Dobbs 1 Bond, 780 ft. N and 390 ft. W SEc, 16-8n-8e, dry, TD 3,500 ft.
Lafayette County: Ford Graham 1 U.S.M., C SE NW NW 22-19s-24w, dry, TD 2,915 ft.
Nevada County: Lawton Oil Corp. 1 Barbaree "A," C SE NE 14-14s-23w, dry, TD 5,622 ft.
Prairie County: R. E. Smith 1 Stewart Lumber Co., 1,124 ft. N and W SEc, 23-5n-7w, dry, TD 1,080 ft.

Texas Gulf Coast

Drill-Stem Tests Taken At Bee County Wildcat

HOUSTON.—Bright and Schiff, Dallas operators have taken drill-stem tests at their 1 R. L. and Neil Schoolfield, Bee County wildcat. Test was drilled to 8,810 ft. with the top of the Strickland sand being called at 7,827 ft., and the top of the Luling at 8,010 ft. On drill-stem test taken at 8,023-28 ft., with ¼-in. choke, recovery was 90 ft. of oil-cut mud and 200 ft. of salt water. Operators ran log at 8,810 ft. and set 5½-in. production casing at 8,810 ft. Well was perforated at 7,840-44 ft., and flow was estimated at 1,250,000 cu. ft. of gas per day, on ¼-in. choke. At present well is shut-in for potential, after being tested through various size chokes, with no gage details. Well is located on the James G. Morrow Survey, A-229.

Humble Oil & Refining Co. has recovered pipeline oil from drill-stem tests made in the 1 Charles L. McCaslin, wildcat, in Live Oak County, about 18 miles south of George West. Drill-stem test was made at 4,539-50 ft., on 1-in. bottom choke, and 3/16-in. top choke, recovered 1,500 ft. of pipe-line oil and 11 ft. of oil-cut mud. Another drill-stem test at 4,554-61 ft. through 1-in. bottom choke and 3/16-in. top choke, recovered 1,270 ft. of pipe line oil. Cores were taken at 4,625 ft., however, no information is available concerning these cores. Operation lies on the J. H. Dennis Survey, A-162.

In Liberty County, 4 miles north of Hardin, J. D. Hedley and A. E. Jordan have made hole to 8,500 ft. in their 1 R. M. Perryman, Jr. and are waiting on cement after running 5½-in. production string to 7,343 ft. Operators cored shale with streaks of sand from 7,325-65 ft., drilled to 7,888 ft., and cored shale and sand to 7,922 ft. Location is on the Amos Green League, A-41.

General Crude Oil Co. has abandoned 1 Garth Brothers after drilling to 11,525 ft. with no shows reported, 6 miles southwest of Dayton and 1 mile west of Esperson dome in Harris County. The failure is on the Meredith Duncan Survey A-17.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

Chambers County: Sun Oil Co. 30 Felix Jackson, South Oyster Bayou, IP flowed 80 per cent water and 20 per cent oil on 14/64-in. choke, IP flowed 1,400,000 cu. ft. of gas per day open flow, 59.9° gravity oil, prod. upper Frio zone.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Bee County: R. Delange, Delta Gulf Drilling Co. and W. M. Nichols 2 Geo. W. Coree, Taver Hensley Subd., dry, TD 7,500 ft.
Brazoria County: Claud B. Hamill 1 R. R. Kropp, John McNeal Sur., dry, TD 543 ft.
Humble Oil & Refining Co. 1 Southwest Angleton gas unit 1, Wm. Roberts Sur., dry, TD 11,400 ft.
Colorado County: Skelly Oil Co. 1 Joe Krenek, SA&MG RR Sur., dry, TD 9,954 ft.
DeWitt County: F. William Carr 1 Paul Wollney, L. V. Criswell, dry, TD 7,515 ft.
Jackson County: Hassie Hunt Trust 1 Vera Allen, Jos. Rector Sur., dry, TD 7,035 ft.
Earl T. Mackey 1 Lon Drushel, Elizabeth McNutt Sur., dry, TD 6,869 ft.
Karnes County: Edwin L. Cox 1 J. M. Barth, D. Buckley Sur., dry, TD 7,780 ft.
H. H. Howell 1 V. M. Butler, Geo. Elliott Sur., dry, TD 4,018 ft.
Lavaca County: Randerson & Scoggins 1 Harvey Renger, James Campbell Lge., dry, TD 4,010 ft.
Tennessee Producing Co. 1 Fannie Whitfield, J. P. Smith Sur., dry, TD 8,505 ft.
Refugio County: Dallas Husky 1 Wilson Heard, J. Sinnott Sur., dry, TD 6,256 ft.
Rock Hill Oil Co. 2 A. D. Rooke, Dona Anastacio Roejas Sur., dry, TD 7,400 ft.
Victoria County: Fidelity Oil & Royalty Co.

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C. C. Gilger 1 Jos. A. Schmidt, T&NO RR Sur., dry, TD 5,520 ft.

Alaska Steamship Co. 1 J. J. Shiller, M. A. Castanon Sur., dry, TD 4,874 ft.

G. R. Schimel 1 Etta Terrell, Antonio Sideck Sur., dry, TD 5,250 ft.

Southwest Texas

Production String Run At Atascosa Wildcat

CORPUS CHRISTI.—Hankamer Investment Co. has run 5½-in. production string to 3,771 ft. in the 1 W. T. Hurt wildcat in Atascosa County. Drill-stem test was run on Section 3,773-79 ft. and on ¼-in. chokes received good blow and in 18 minutes recovered 750 ft. of oil, small amount of mud, not any water. Also tested open hole from 3,711-19 ft. and well flowed 4 bbl. of oil per with 22° gravity. Location is on the Kindallis Bryan Survey, A-69.

R. H. Abercrombie and V. F. Neuhaus' wildcat, the 1 Gorman Fox et al, is Willacy County, confirms oil production on initial test. Production is through perforations 7,781-7,806 ft. and 7,850-7,874 ft. Well flowed an estimated 142 bbl. of 30.7°-gravity oil per day on 9/16-in. choke, with tubing pressure of 725 psi. and casing pressure 550 psi., and gas-oil ratio 423:1. Test was bottomed at 7,887 ft. with 5½-in. production casing set at 7,887 ft. and 2-in. set at 7,838 ft. Operators ran log at 7,775 ft. and at present are waiting on potential. Well is on the San Juan de Carrioitos Grant.

Barron Kidd 1 J. W. Phillips is a gas discovery well, approximately 7 miles northeast of Bruni, in Duval County. The new gas producer was completed from perforations in the Cole sand at 1,720-22 ft. Completion was for an initial potential flow 1,011,000 cu. ft. of gas per day on open flow. Location is on Survey 320.

Larry Rogers operating from offices in San Antonio has filed applications to drill the 1 Larry Rogers wildcat in Bexas County. Well is slated to be drilled to a proposed depth of 1,200 ft. which will be through the Trinity sand series. Operator will start coring around 800 ft. to test zone encountered around 900 ft. in a water well that was drilled 1,500 ft. to the south and across fault from new operation. Location is on Wm. Head Survey.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCAT

Aransas County: Hunt Oil Co. 1 St. Tr. 83, Aransas Bay Tr. 83, TD 8,694 ft., IPF 64 bbl. of oil per day on 3/16-in. choke, gas-oil ratio 360:1, 42°-gravity oil.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: Sun Oil Co. 1 St. Charles St. Tr. 385, St. Charles Bay, dry, TD 11,505 ft.

Bandera County: G. L. Rowsey 1 G. L. Rowsey, 10.5 miles NW Bandera, dry, TD 4,178 ft.

Duval County: Jake L. Hamon, Edwin L. Cox & Geo. H. Coates A-1 Alonzo Taylor, Trinidad Vela Grant, A-612, dry, TD 5,710 ft.

Frio County: R. K. Taylor and A. A. Davis 1 Otto J. Dorman, L. Richardson Sur., dry, TD 1,011 ft.

Kinney County: Lenoir M. Josey, Inc. 1

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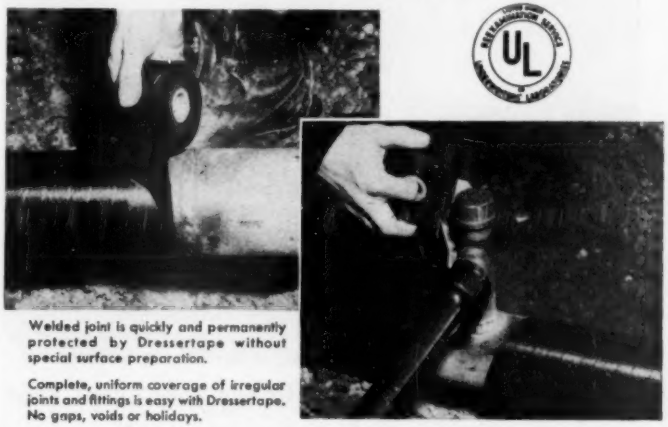

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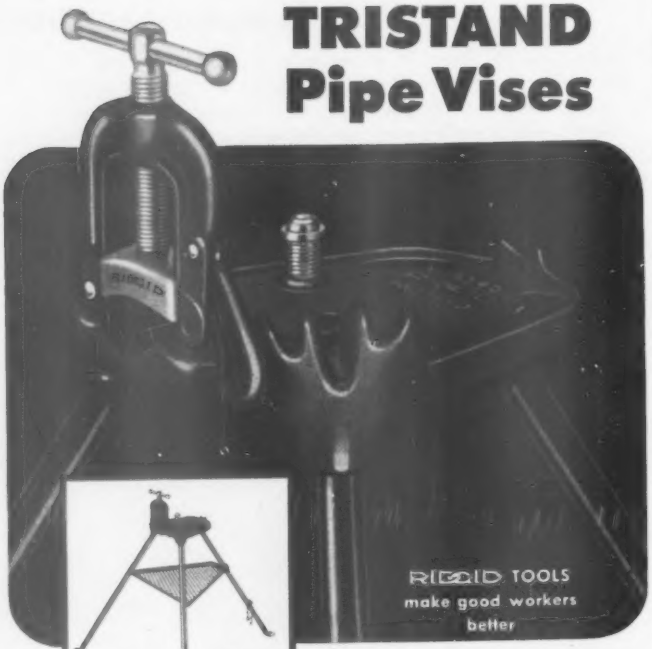

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Augustus F. Beidler Est., Meliton Valdez grant, dry, TD 4,006 ft.

Webb County: Lundells, Inc. 1 J. E. Neal, 3 miles SW of Bruni, dry, TD 3,352 ft. H. R. Smith 4 Semmes-Duval Co. Ranch, Zapata Co. School Land., dry, TD 6,075 ft.

Wilson County: Hankamer Investment Co. 1 Thom Wright, M. A. Rodriguez Sur., dry, TD 4,491 ft.

South Louisiana

First Oil Pay Opened At Pecan Lake Field

NEW ORLEANS.—In the southeast area of Pecan Lake field, Cameron Parish, Pan American Production Co. has opened the first oil pay for the field at its 4 Miami Corp. Potentialed on a 12/64-in. choke, well flowed at rate of 498 bbl. of 35.8°-gravity oil daily, through perforations from 10,548-10,552 ft. Tubing pressure was 1,650 psi., and gas-oil ratio 505:1. Bottomed at 12,501 ft., new pay has 5½-in. casing cemented at 12,499 ft. and 2-in. tubing swung at 10,514 ft. Prior to taking potential, well flowed at the rate of 475 bbl. of oil plus 346,000 cu. ft. of gas daily.

In the west Delta area, Block 30, Jefferson Parish, Humble Oil & Refining Co. has completed the 1-D State Lease 819, as a shut-in gas well. Bottomed at 2,856 ft., with 5½-in. casing set at 2,703 ft. and 2⅜-in. tubing swung at 2,438 ft., well previously flowed dry gas at rate of 225,500 cu. ft. of gas daily through ⅛-in. choke. Tubing pressure registered 750 psi. Prior to the test, the operator had swabbed well, recovering salt water with a trace of oil.

New pay for the East Golden Meadow area, Lafourche Parish, has been opened by the Humble Oil & Refining Co. at the C-7 Louisiana Land & Exploration Co., at 10,500 ft. Initial gage, on a 3/16-in. choke, flowed 166 bbl. of 44.7°-gravity distillate plus 2,263,000 cu. ft. of gas per day. Tubing pressure was 3,275 psi. and gas-liquid ratio was 13,567:1. New pay has 7-in. casing set on bottom with 2⅞-in. tubing at 10,142 ft. Location is on Section 43-19s-22e.

Shell Oil Co. has reported running a drill-stem test at the 1 State Lease 1814, Iberia Parish wildcat, for a small amount of dry gas on ¼-in. by 20/64-in. chokes. Well flowed under 8 psi. of working pressure with bottom hole flowing pressure of 2,350 psi. Originally drilled to 16,000 ft., well is now bottomed at 15,241 ft. in sidetrack hole with 7-in. casing set at 14,749 ft. Well is located in Section 18-17s-6e.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Beauregard Parish: Magnolia Petroleum Co. 1 Long-Bell "D," 10-6s-9w, TD 9,296 ft., IPF 78 bbl. of oil per day plus 624,000 cu. ft. of gas per day, 8/64-in. choke, 47.9°-gravity oil.

Calcasieu Parish: Sun Oil Co. 5 Lutcher-Moore, 2-8s-13w, TD 9,722 ft., IPF 145 bbl. oil per day, 1,465,000 cu. ft. of gas per day, 50.6°-gravity oil.

St. Mary Parish: Phillips Petroleum Co. 2 Continental Fur, 24-18s-14e, TD 12,283 ft., IP 41 bbl. of oil per day, 5,500,000 cu. ft. of gas per day, 52.6°-gravity oil.

St. Martin Parish: Humble Oil & Refining Co. 1 Mrs. W. H. Crowson, 26-10s-9e, TD 13,462 ft. IP 281 bbl. of oil per

day on 8/64-in. choke, 162,000 cu. ft. of gas per day, 36.7°-gravity oil.

West Baton Rouge Parish: The Texas Co. 1 Baist Cooperage & Lumber Co., 97-7s-10e, TD 12,300 ft., IP 324 bbl. oil per day 14/64-in. choke, 36.4°-gravity oil.

SOUTH LOUISIANA WILDCAT FAILURES

St. Mary Parish: The California Co. 1 Fairfax Foster Bailey, 42-15s-9e, dry, TD 11,500 ft.

Vermilion Parish: Reese E. Carter 1 Timothy Hardy, 34-11s-3e, dry, TD 10,510 ft.

Mississippi

Information Released On Paleozoic Area Test

JACKSON.—In the Paleozoic area of northeastern Mississippi, Union Producing Co. has released all information on 1 Watson, Section 31-15s-7e, located approximately 4 miles southeast of the Muldon field discovery well in Monroe County. Top of Paleozoic was picked at 985 ft. and continuous coring was started at 2,801 ft. A total of 103 cores were cut to total depth of 6,732 ft. This dry hole was bottomed in Devonian chert. A total of 7 drill-stem tests were attempted in open hole as the well was being cored. Slightly gas-cut salty mud was recovered from test at 5,732-58 ft. in Hartselle sand. Gas-cut mud was recovered from test at 6,196-6,246 ft. in Bethel sand. After the well was cored to total depth, both of these zones were shot with nitro and tested again. The upper zone was shot at 5,721-87 ft. with 200 quarts. On 2-hour test after the shot, recovery was 950 ft. of very gas-cut mud and 3,000 ft. of mud-cut salt water.

In Stone Co., Mississippi, the second deepest well in the world, Geo. Vasen, 1 Fee Section 9-7s-11w, has set 6,798 ft. of 5-in. liner at 13,540 to 20,338 ft. and cemented it with 324 sacks of special high temperature cement. The bottom 360 ft. of this liner was nickel plated on the inside. The bottom 40 ft. was perforated before it was run in the hole. It will be recalled the 7-in. casing had been cemented to 14,038 ft. and total depth of the sidetracked hole was 20,450 ft. Operations are shut down again until a string of nicked plated tubing is delivered. Operators will then attempt to test shows of sour gas which kicked while the well was being cored at approximately 20,298 ft.

Ohio Oil Co. 1 Coleman-Powe A/C 2, Section 32-1n-12w, located approximately ¾ mile northwest of the Maxie field discovery well, Forrest County, Mississippi, is drilled at 7,214 ft. and will probably start coring at 7,240 ft. Top of chalk was picked at 6,007 ft. and base of chalk at 7,171 ft. Both points are approximately 25 ft. lower than the discovery well. This is approximately the structural position that had been expected and should be high enough to have good accumulation.

MISSISSIPPI WILDCAT FAILURES

Franklin County: B. Serio 1 Mrs. Effie Whittington, 30-6n-4e, dry, TD 7,004 ft.

Madison County: J. E. Stack, Jr. 1 G. L. Crawford, 7-7n-2e, dry, TD 3,905 ft.

Monroe County: Union Producing Co. 1 Nancy Watson, 31-15s-7e, dry, TD 6,714 ft.

Winston County: A. P. Flannes, J. C. Stien-

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metz, Trustee, 1 D. L. Fair Lumber Co., 27-14n-14e, dry, TD 4,579 ft.

ALABAMA WILDCAT FAILURE

Clarke County: Humble Oil & Refining Co. 1 A. S. Johnson, 7-6n-4e, dry, TD 5,810 ft.

Canadian Fields

Alberta Records Six New Discoveries

CALGARY.—Five Alberta exploratory drillers accounted for six discoveries during the past seven days, four new oil finds and two gas strikes. In addition, this week a Pigeon Lake area driller found D3 Devonian wet and will prove to be either a discovery or extension after further coring and testing in D3.

One of this week's oil discoveries proved to be the first Canadian well to produce oil in indicated commercial volume from the basal Colorado sands, another found dual zone production in the Sunburst sand and a limestone formation, while the fourth strike was in the D2 Devonian zone. All the oil discoveries this week were in southern Alberta, while the two gas finds are in the central sector of the province.

The Colorado sand strike was made by Amurex Oil Development Co. & Associates on farmout lands from Trans Empire Oils, Ltd., near Cessford, 100 miles east of Calgary. This venture gave up 18.1°-gravity oil during test from 2,924-31 ft., has set string of production casing, and crew will likely drill out plug over the weekend and swab well into production. Pipe recovery during the above test was 750 ft. of clean oil, no water.

The dual horizon oil discovery was made by a team of five Canadian independents, on farmout from Socony-Vacuum Exploration Co., at Chancellor, 50 miles east of Calgary. This well found 34°-gravity oil in the Sunburst sand and 29°-gravity oil in the Madison limestone. Hole has been carried down 44 ft. below bottom of first Madison test that gave up oil, and crew is now drill-stem testing. The Sunburst oil section was contacted at 4,765 ft.

The Devonian oil discovery came at a venture which lies 6 miles west of Drumheller Devonian and Cretaceous oil wells, 60 miles northeast of Calgary. The well, Mazal 1 Drumheller indicated approximately 45 ft. of D2 zone above the water line. One of the drill-stem tests flowed light gravity oil to the surface in 30 minutes, while latest test in the D2, from 5,549-71 ft., flowed gas at estimated rate of 50,000 cu. ft. daily and gave a 65-minute recovery of 780 ft. of oil and 660 ft. of brackish sulfur water. Production string of casing has been delivered to wellsite, and is scheduled to be run over the weekend.

The Pigeon Lake well that entered D3 coral reef this week is owned by Stanolind Oil & Gas Co., and The California Standard Co. It lies about 3 miles southwest of Texaco's discovery and that same distance northeast of Gulf & Associate's discovery. Wet gas flows up to 6,000,000 cu. ft. per day have so far been found, and 76 ft. of D3 reef had been cored and tested by week's end.

CANADIAN WILDCAT FAILURES

Merrill 7-16 Kirriemuir, LSD 7, 16-34-3w4, TD 4,042 ft.

Albermont-Canadian Pipe 1 Provost, LSD 16, 34-42-2w4, TD 2,753 ft.

Royalite-Tor 21-63 Cold Lake, LSD 6, 21-63-3w4, TD 1,075 ft.

Royalite 1 Eagle Butte, LSD 12, 32-7-4w4, TD 4,298 ft.

Phillips 1 Kelsey, LSD 10, 29-45-18w4, TD 4,875 ft.

EASTERN CANADA

Gaspe.—New Peninsular Oils, Ltd., of Sorel, Que., headed by Louis Hudon, is planning an important deep test on a concession of 44,000 acres on the Gaspe peninsula, taken over from a predecessor, Peninsular Oil Co. Oil seepages were first reported in this area in 1836, and intermittent drilling, mostly shallow, has been carried on since 1860, without commercial results. The original Peninsular Oil Co., had a well drilled to 5,000 ft., and New Peninsular is bringing in a rotary outfit equipped for diamond coring and will deepen the test to around 7,000 ft. Bates & Cornell, petroleum geologists and engineers of Lafayette, La., have been retained as consultants.

Ontario.—In Aldborough township, Elgin County, south of Wardsville, Western Ashley Minerals 5 showed 222,000 cu. ft. gas on initial flow test from the Guelph-Niagara formation, and a dynamite shot increased it to 400,000 cu. ft. Western Ashley 6 showed around 100,000 cu. ft. and will also be given dynamite perforation. Two additional wells are drilling with seven more locations made. The company plans a minimum of 25 wells on its 1,710-acre tract south of Wardsville. Gathering lines are being laid from the new producers to deliver gas to the 7-mile pipe line from the field to Rodney, which will there link with the Dominion Natural Gas Co. transmission line.

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North-Central Texas

Free Oil Recovered At Archer Wildcat

WICHITA FALLS.—An Archer County wildcat recovered 45 ft. of free oil, 45 ft. of fresh water and 120 ft. of oil-cut mud at Lewis B. Welch's 1-C C. L. Abercrombie, 5 miles west of Archer. The Fort Worth operator ran a 1-hour drill-stem test of zone between 1,360-421 ft. Operator continued drilling below 1,870 ft.

In Wichita County, Akin & Dimock's 1 Frances Ann Dickinson gaged a pumping potential of 83 bbl. of 42°-gravity oil daily from open hole between 4,239-260 ft. Hole was bottomed at 4,260 ft. Gas-oil ratio was 200:1. Location is ½ mile east of West field.

In Lamar County, C. G. Glasscock, of Corpus Christi, staked a 3,000-ft. wildcat about 4 miles southwest of Roxton in Lamar County as his 1 W. E. Umberson on an 87.3-acre lease.

In Grayson County, Cox Drilling Co. drilled plug at its 1 Bailey-Talley unit after cementing production casing at about 5,300 ft. at 1 Bailey-Talley unit. Hole is bottomed at 6,000 ft. The well showed oil on 2 drill-stem tests in unidentified sand, between 5,295-305 ft. and between 5,305-314 ft.

C. J. Simpson Drilling Co. had a discovery prospect at his 1 John Rivoire about 5 miles southeast of Marysville, in Cooke County. It recovered on 1½ hour drill-stem test, 1,260 ft. of gas, 285 ft. of oil and 15 ft. of oil-cut mud from zone between 3,747-57 ft. A second 1-hour test, between 3,751-563 ft. recovery was 400 ft. of oil, 20 ft. of oil-cut mud and 2,500 ft. of gas. Bottom-hole pressure was 1,200 psi.

NORTH CENTRAL TEXAS (DISTRICT 7B AND 9) SUCCESSFUL WILDCATS

Jack County: S. D. Johnson 2 M. Clerihew, M. Putnam Sur., TD 3,249 ft., elev. 1053, pay 3,244 ft., IP 100.27 bbl., 39°-gravity oil.

W. H. Price et al, L. B. T. Green, Myrick Sur., A-394, TD 3,103 ft., pay 3,009 ft., elev. 1,194 ft., IP 65 bbl. 42°-gravity oil.

Ward & McCullough 1 J. D. Gillespie, J. Allen Sur., A-2,140, elev. 1,055 ft., TD 4,547 ft., pay 3,494 ft., PT 96 bbl. 42°-gravity oil, GOR 1,175:1.

Warren Oil Corp. 1 M. L. Smith, A. Herring Sur. A-282, TD 3,700 ft., PBTD 3,250 ft., pay 3,225 ft., IP 23 bbl. 40°-gravity oil, GOR 115:1.

Young County: Lebus Bros. 4 Allar Co., TE&L Sur., A-1,230, TD 2,407 ft., pay 2,396 ft., 80.04 bbl. 40°-gravity oil, GOR 300:1.

NORTH CENTRAL TEXAS (DISTRICT 7B & 9) WILDCAT FAILURES

Archer County: W. F. Bockhoff L. Baldwin, BBB&C Sur., dry, TD 1,281 ft.

H & J Drilling Co. 1-A E. E. Threttt, M. Pickens Sur. A-341, dry, TD 1,231.

Sidx Perryman & Oltex Drilling Co. 1 John S. Davis, J. McCarney Sur. A-289, dry, TD 1,125 ft.

Baylor County: Megargel Drilling Co. 2 J. J. Sykora, W. H. Loggin Sur. A-265, dry, TD 1,485.

Clay County: S. D. Johnson 1 D. Castle et al T. Robbins, Sur. A-293, dry, TD 6,110 ft., conglomerate 5,508 ft., Barrett shale 5,935-75 ft.

Cooke County: Bolin Oil Co. 1 H. Trew, S. W. McKneely Sur. A-656, dry, TD 1,960 ft., Ellenburger 1,925 ft.

Jack County: Bridwell Oil Co. 1 R. H. Morgan, G. Hallmark Sur. A-253, dry, TD 5,729 ft., Caddo 5,952 ft.

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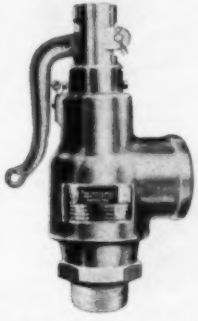
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L. T. Burns 1 Lester Carter, TE&L Sur. A-742, dry, TD 4,642 ft.

Joe H. Deer 1 J. B. Martin, Texas Emigration & Land Co. Sur. A-751, dry, TD 538 ft.

John L. McMahon, Jr. 1 A. C. Rogers, T. E. Allen Sur. A-1,901, dry, TD 420 ft.

Republic Natural Gas Co. 1 Laura V. Ainsworth, dry, TD 3,355 ft., elev. 1,273:4 ft.

Montague County: Kewanee Oil Co. 1 Boyd, W. Edwards Sur. A-227, dry, TD 7,418 ft., elev. 1,037 ft., Caddo 6,713 ft., Marble Falls 7,270 ft.

Wilbarger County: R. E. Huntley 2 Huntley-Waggoner, H&TC Sur., dry, TD 1,935 ft., elev. 1,120 ft.

Tom B. Medders I-A J. M. Collins, H&TC Sur. TD 5901, dry, elev. 1,341 ft.

Young County: W. F. Bockhoff Tr. 1 W. F. Wilburn, TE&L Sur., dry, TD 1,277 ft.

R. W. Darden 2 Mrs. Faye Clark, TE&L Sur., dry, TD 810 ft.

R. R. Kolp et al 1 Logan Est., TE&L Sur. A-1,084, dry, TD 707 ft.

E. H. Remington 2 C. J. Taack, TE&L Sur. A-510, dry, TD 662 ft.

Oklahoma

Gas-Distillate Discovery Gets First Confirmation

THE recent discovery by R. W. Hilbert of sizable gas-distillate production from a basal Pennsylvanian sand in the area about 2 miles east of the south end of the Oklahoma City field, in Oklahoma County, is being confirmed by an indicated producer in the same pay zone now being tested by Magnolia Petroleum Co. at a location a half mile north of the discovery well.

Magnolia's well is 1 Cawthorn, in the NW NW NW 34-11n-2w, which, in a 60-minute drill-stem test of the discovery well's pay zone at 6,729-45 ft., flowed gas at the rate of 4,600,000 cu. ft. per day and recovered 60 ft. of distillate and 430 ft. of gas-cut mud. Hole was deepened to 6,875 ft. in Hunton lime, but with water in that formation, it has been plugged back for present productivity tests in the Pennsylvanian.

The discovery well, Hilbert's 1 Rice, NW NW SW 34-11n-2w, flowed 35,000,000 cu. ft. of gas with 96 bbl. of distillate per day at completion in July. The two wells are located on the east, and downthrow side of a fault which separates them from the Oklahoma City field where main production is from the Wilcox sand.

Sinclair Oil & Gas Co. is listing as complete its 1 Maple, a gas-distillate discovery well in northeastern Beaver County, in the Panhandle. The well, located in the C SW NE 26-5n-24eCM, has been in process of testing for more than a month, during which tests it flowed at rates up to more than 3,000,000 cu. ft. of gas per day. Completion flow was gaged at 857,000 cu. ft. per day. Pay zone is at 6,495-6,548 ft. in the Mississippian Chester lime.

K. A. Ellison is opening a new Misener sand pool in northwestern Lincoln County where his 1 School land, in the SW SE SW 16-16n-2e, 2 miles east of Merrick, flowed at the rate of 5 bbl. of oil per hour through 20/64-in. choke. Pay is in open hole at 4,842-51 ft.

Promising gas showings have been encountered in the Hoxbar section by G. C. Parker at his 1 Boyd Miller, C NE SW 22-15n-16w, a rank wildcat 3 miles north of Independence, in Custer County, in the western part of the state. Although no drill-stem tests were made, showings were estimated good for at least 1,000,000 cu. ft. per day. Indicated pay was at 8,650-8,750 ft. Showings have been passed up with hole being deepened to its original objective of 12,500 ft.

Development of Springer sand production in the Sholem Alechem field in Carter County is being given a boost by a discovery made by C. L. McMahon at his 1 Newstadt, SW NW SE 32-1s-3w. The well, located in the southeast portion of the field and 1½ miles northwest of a Springer sand producing area opened in 1951, topped the Springer Humphreys sand at 6,020 ft. and in a drill-stem test in that pay at 6,022-40 ft. flowed gas and 45°-gravity oil. Gas was at the surface in 6 minutes and oil in 55 minutes.

OKLAHOMA SUCCESSFUL WILDCATS

Oklahoma County: R. W. Hibbert 1 Rice, NW SW 34-11n-2w, flowed 96 bbl. of distillate and 35,000 M.c.f. of gas from basal Pennsylvanian sand 6,714-30 ft., TD 7,480 ft.

Payne County: Fullerton Oil Co. 1 Nelson, NE SW NE 25-18n-2e, flowed 240 bbl. of oil from lower Skinner 4,153-55½ ft., 40.6° gravity, TD 4,796 ft., PBTD 4,168 ft.

Pittsburgh County: Choctaw Gas Co. 1 Pilgrim, SE SE NW 19-7n-17e, flowed 1,533 M.c.f. of gas from Hartshorne 2,560-2,725 ft., TD 2,770 ft., PBTD 2,725 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: W. I. McCarty et al 1 Coffee, NW NW SE 29-4s-1e, dry, TD 2,762 ft.

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Garvin County: Warren Shear et al 1 Palmer, NW NW SW 35-1n-1w, dry, TD 2,505 ft.
C. L. Carlock 1 Knight, SE NW SE 17-1n-1e, dry, TD 5,026 ft.
Jackson County: Harper-Turner 1 Hanna, SW SW NE 25-1n-20w, dry, TD 2,875 ft.
Johnston County: Tom C. Greer 1 Harland, N½ NW NW NE 33-3s-5e, dry, TD 45 ft.
Lincoln County: Thompson & Harris 1 Clegern, NW NE NW 28-15n-4e, dry, TD 5,041 ft.
Big Four Petroleum and R. L. Kemp 1 Alice Pickard, NW NW NW 10-16n-6e, dry, TD 3,494 ft.
Logan County: Josaline Producing Co. 1 Martin, C SE SE 32-15n-3w, dry, TD 6,647 ft.
Amerada Petroleum Corp. and Skelly Oil Co. 1 Wilson, NW SE SE 12-16n-2w, dry, TD 5,896 ft.
Love County: A. R. Dillard 1 Shurbet, NW NW SW 33-8s-2e, dry, TD 5,637 ft.
Osage County: C. L. McMahon 1 Osage, SW NE SE 29-24n-4e, dry, TD 2,560 ft.
Pontotoc County: Davon Oil 1 Bumpers, NW NW SW 20-4n-5e, dry, TD 1,640 ft.

Rocky Mountain

Fourth Discovery in North Dakota Finaled at Charlson

DENVER.—Significant completions spotted important areas of the Williston basin this week. In North Dakota Amerada Petroleum Corp. completed the fourth pool discovery for the state at the 1 North Dakota "D," C NE NW 16-153n-95w, in the Charlson area of McKenzie County for an initial flow of 127 bbl. of approximately 40°-gravity oil with 131 bbl. of water per day. Completion was on ½-in. choke.

The well lies between the Croff area and the Beaver Lodge pools. Top of Madison in the new pool discovery was at 8,725 ft. with production from the zone 8,998-9,042 ft., following 5,000-gal. acid treatment. Gas was produced with the oil at the rate of 476,000 cu. ft. per day with a tubing pressure of 80 psi.

In the Cedar Creek field, Dawson County, Montana, The Texas Co. has completed another new pool opener at 1 Northern Pacific "G" (NCT 4), C SW SW 23-17n-53e, for a gage of 191 bbl. daily, with production believed to be from Devonian. This well is 14 miles north of the Cedar Creek discovery, and north of a recent failure between the two pools. Total depth was 10,128 ft. with Red River topped at 9,417 ft. The well was plugged back to 9,953 ft. for completion.

Further south along the Baker-Glendive anticline Shell Oil Co. has completed an important confirmation well at the Pine Unit area discovery in Wibaux County. The well is 14-29, C SW SW 29-12n-57e, completed for a flow gage of 431 bbl. of oil daily through 16/64-in. choke. Total depth was 9,020 ft. with top of Devonian reported at 8,363 ft., and producing zone 8,896-8,936 ft. The completion is a ½-mile southeast extension to the discovery in this area which was completed early this year.

In the Richey area, Dawson County, McConnell Drilling Co. was reported to have tested oil and gas shows in the 1 Normand, SE SE 1-23n-49e, 2 miles north of the Shell discovery in this area. The wildcat is drilling below 7,020 ft., with no data other than drilling depth now being released.

Shell is testing at several Richey area extensions. The company's 44-13 Zuroff, C SE SE 13-23n-49e, and offset to the pool opener flowed at the rate of 1,125 bbl. of fluid per day, of which 1,058 bbl. was oil. Producing zones are from 7,034-45 ft., and 7,053-85 ft., and production followed acid treatment. Casing has also been set in 44-23 NP, a mile southwest of the Richey discovery. Drill-stem tests of this well have not been particularly encouraging.

In the east Tioga area of Mountrail County, North Dakota, M. B. Rudman-Concord Development Co. et al have topped Madison at 8,036 ft. in the 1 Nesset, C SE SE 30-157n-49w, and on test from 8,194-8,256 ft. the recovery in 4 hours was only 330 ft. of slightly gas-cut mud and water cushion. The operator is coring ahead below 8,256 ft. on this important wildcat.

Outside the Williston basin area the week produced an apparent discovery in the East Johnson area of Cheyenne County, Nebraska, where Hope Oil Co. has set casing on the 1 Grabolwski, NW NW SW 17-15n-48w. The wildcat had shows in both "D" and "J" sands, with the "J" showing more than 16 ft. of saturated section in cores, according to the operator. No drill-stem tests were run prior to setting of casing.

In the southeastern portion of the Denver-Julesburg basin further shows along the Las Animas arch in Kiowa County have added interest to the current campaign featuring several deep tests in this area. Continental Oil Co. reported staining in cores of the 1 McClabe, SE SE SE 11-20s-49w. Shows were in the interval 3,880-3,901 ft., with top of Kansas City at 3,680 ft. Drill-stem test had no show. Several shows in Pennsylvanian formations in this area during recent months have marked exploration to formations older than Cretaceous in this portion of the basin.

In Utah The Carter Oil Co. has logged

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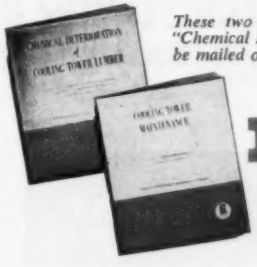

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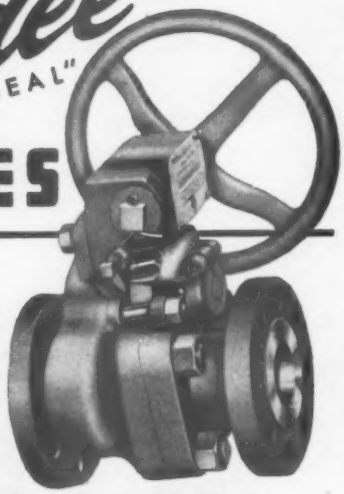

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shows in the 1 Moon, C SW SE 8-4s3w (USM) in the Antelope area of Duchesne County for a possible wildcat discovery. The wildcat has had intermittent shows of oil and gas from 2,580 ft. to present depth of 7,378 ft. Drill-stem test of the zone 7,169-7,236 ft. had gas to the surface in 70 minutes, with a recovery after 2 hours of 150 ft. of slightly oil and gas-cut mud, and 90 ft. of mud-cut oil. Carter is drilling ahead below the tested interval. Southeast of this well Ohio Oil Co. has had slight shows in the 1 Ute Tribal, C NE SW 26-4s-3w, with gas-cut mud recovered on 75-minute test from 3,633-3,757 ft. This is the first venture by Ohio in the current drilling activity of the Uinta basin.

COLORADO WILDCAT FAILURES

Logan County: J. E. Manning 1 Bamford, NE NW NW 30-7n-54w, dry, TD 5,295 ft.

Ginther-Warren & Ginther 1 Mathewson, SW NE SW 12-9n-55w, dry, TD 5,437 ft.

Anschutz Drilling Co. 1 Frank Sparks, SW SW SW 28-12n-48w, dry, TD 4,365 ft.

Phillips County: Canada Southern Oils, Inc., 1 George Leonard, C NE NE 26-6n-46w, dry, TD 3,742 ft.

Washington County: J. L. and R. L. Rush 1 Resler, NW NW NW 29-1s-51w, dry, TD 4,813 ft.

WYOMING WILDCAT FAILURES

Converse County: Couch Drilling Co. 1 Frenholm, SE SW SW 17-31n-69w, dry, TD 460 ft.

Carbon County: Lowell & Daniels, Inc., 1 Government W-41, NW SE SE 6-24n-87w, dry, TD 4,995 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Cheyenne County: Kewanee Oil Co. 1 Olson, SE SE SE 1-13n-50w, dry, TD 5,076 ft.

F. Kirk Johnson-Dunn & Boreing et al 1 Herboldsheimer, SW SW SE 13-14n-52w, dry, TD 5,356 ft.

Sheridan County: Niloco-Lucerne 1 Krause, C NE NE 17-26n-46w, dry, TD 4,682 ft.

Garden County: Niloco-Lucerne 1 C. L. Peterson, SE NW SE 12-22n-46w, dry, TD 5,665 ft.

MONTANA SUCCESSFUL WILDCAT

Roosevelt County: C. H. Murphy, Jr. 1 Unit, C SW NE 2-28n-51e, calculated 400 bbl. of oil daily on ¼-in. choke, Charles discovery, new field, TD 9,163 ft., PBTD 5,827 ft.

Eastern Texas

New Wildcat Staked In Wood County

DALLAS.—Ace Oil Co., of Tyler, staked location for 1 W. G. Highnote as a new wildcat in Wood County, about 3 miles southeast of Winnsboro on a 100-acre lease. Slated depth is 6,700 ft.

In the same county, A. O. Phillips of Dallas spotted his 1 W. A. Griffis in Shirley-Barbara field 3 miles south of Pine Mills. Contract depth is 5,700 ft.

In Ellis County, L. H. Hughes located his No. 1 Noble Willis as a 2,000 ft. wildcat. It is spotted on an 188-acre lease in the R. D. LaPena Survey about 2 miles west of Bristol.

EAST TEXAS (DISTRICT 5 AND 6) WILDCAT FAILURES

Navarro County: Carter-Gragg Oil Co. 1 W. D. Lewis, Robert Caradine Sur. A-139, dry, TD 7,041 ft.

Smith County: Sinclair Oil & Gas Co. 1 A. D. Clark, Jesse Crip Sur. A-232, dry, TD 7,728 ft.

Upshur County: Associated Oil Field Rentals, Inc. 1 R. W. Burnett et al, Patmos Tuel Sur., dry, TD 5,659 ft.

Wood County: B. B. Orr 1 A.G.C. Mann, J. M. Servantes Sur. A-5, dry, TD 5,785 ft.

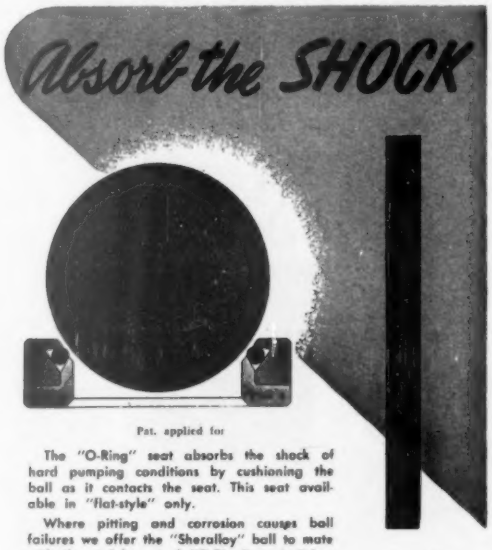
Cherokee County: Frank & George Frankel 1 A. H. Rouse et al, W. J. Steinsipher Sur. A-801, dry, TD 9,419 ft.

Appalachian-Ohio

Rank Test Shows Gas In Gordon Sand

PITTSBURGH.—In Middle Fork district, Randolph County, West Virginia, Blaho Oil & Gas Co., rank wildcat, elevation 2,062 ft., reached the Gordon sand at 1,448 ft., and had gas testing 89,000 cu. ft., at a depth of 1,509-13 ft. Drilling is at 1,530 ft. Lincoln district, Wayne County, Owens, Libbey-Owens 59-839 Wilson Coal Land Co., tested 1,449,000 cu. ft. gas in the Big lime, total depth 1,630 ft. Portland district, Preston County, Cumberland & Allegheny Gas Co., will acidize 1-482 Lola Phillips. The Oriskany was at 5,372 ft., and gas 5,381 ft., testing 119,000 cu. ft.

Maryland.—Garrett County, Maryland: Cumberland & Allegheny Gas Co., completed 2 Harry Rice, gaging 671,000 cu. ft. of gas with a rock pressure of 840 psi., in 24 hours. The Tully was at 3,062 ft., chert 3,633 ft., gas 3,652 ft., TD 5,689 ft. This company's 1 Noah Shrock encountered a bad hole at 4,470 ft., the depth previously reported. Blaho Oil & Gas Co. 1 Joe Garrett, depth 3,711 ft., is drilling by pipe at 3,470 ft. Eagle Oil & Gas Co. 1, John Lohrer will



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be acidized. Gas testing 23,000 cu. ft. was encountered at 3,166 ft.

Pennsylvania.—Unity Township, Westmoreland County, Southwest Pennsylvania: Peoples Natural Gas Co. 4003, A. J. Dotterway is running casing at 8,268 ft. The chert was recorded at 8,270 ft. 4008 J. R. Frola, is drilling at 5,238 ft.

MARYLAND SUCCESSFUL WILDCAT

Garrett County: Cumberland & Allegheny Gas Co. 2 Harry Rice, 671,000 cu. ft. gas, rock pressure 840 psi., in 24 hours, Tully 3,062 ft., chert 3,633 ft., gas 3,652 ft., TD 3,689 ft.

OHIO

Wray Drilling Co. moved ½ mile northeast of the middle part of New Castle pool, and brought in a nice extender on Clarence Reese, third quarter, New Castle Township, Coshocton County. Clinton sand at 3,297-3,360 ft., with 1,130,000 cu. ft. gas and a showing of oil, was shot with 110 qt. The hole is reported to be filled with oil, and the gas drowned out.

In Jackson Township, Knox County, Mid East extender on 1 Delmasso, Section 25, was shot with 150 qt. and made 65 bbl. in 24 hours. Wray Drilling 4 Dugan, Section 18, reported sand at 2,898-2,917 ft. with a good showing of oil that increased to 110 bbl. in 24 hours after a 90-qt. shot.

Mid-Atlantic 1 W. K. Gibson, Lot 14, Washington Township, Tuscarawas County, ½-mile west extension, topped the Berea sand at 944 ft. and finished at 1,000 ft. with a natural gage of 425,000 cu. ft.

Permian Basin

Free Oil Recovered on Second Test at Andrews Well

MIDLAND.—Superior Oil Co. 1-B-11 University, Section 27, Block 11, University Land, ½ mile west of the south end of Block 11 Devonian pool in south-central Andrews County, recovered free oil on a second drill-stem test of the Devonian from 8,294-8,309 ft. Open 1½ hours, gas was at the surface in 6 minutes with no estimate of the volume. Recovery was 300 ft. of heavily oil and gas-cut mud, 5,130 ft. of oil and 170 ft. of oil and gas-cut mud.

Corehole was being reamed to deepen the project, which topped the Devonian at 8,040 ft., minus datum point of 4,740 ft. The well showed gas at the surface and yielded heavily oil and gas-cut mud on a drill-stem test from 8,133-8,239 ft.

Superior will drill a new Devonian project ½ mile south and ¼ mile east of the 1-B-11 University.

In northeastern Andrews County The Texas Co. was running electrical surveys after a drill-stem test from 12,648-678 ft. established water table in the Devonian at 1-AB State, Section 22, Block 5, University Land. Devonian prospect is located 3 miles west of 1-Z State, recently completed discovery in northeastern Andrews County. Open 2 hours recovery was the 2,000-ft. water blanket, 460 ft. of drilling mud and 8,740 ft. of salty sulfur water with some oil stains.

In Ector County, Forest Oil Corp. 1-L TXL, Section 31, Block 43, T-1-N, T&P

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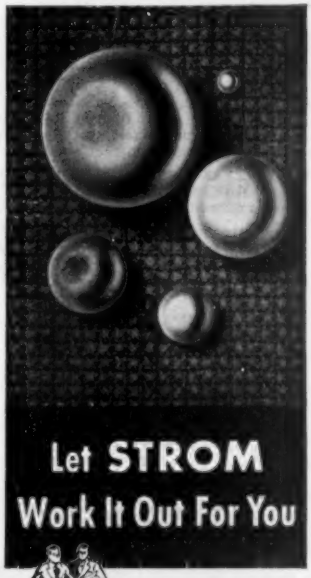

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Survey, 1½ miles west of North Cowden pool, unloaded oil on a drill-stem test of a Permian lime from 5,017-85 ft. Open 3½ hours gas came to the surface in 1¼ hours with no volume estimate. Ninety ft. of free oil was unloaded while drillpipe was being laid down, final recovery being 382 ft. of mud-cut oil. Operator then deepened to 5,220 ft. in lime and was running another drill-stem test.

Phillips Petroleum Co. 1-B-A Puckett, Section 44, Block 101, T&P Survey, 1½ miles west of 1 Glenna, recent record producing depth well, 32 miles southeast of Fort Stockton in Pecos County, was drilling below 8,274 ft. in Permian lime. Recovery on a 2-hour drill-stem test from 8,218-52 ft. showed gas at the surface in 15 minutes and 150 ft. of gas-cut mud.

WEST TEXAS (DISTRICTS 7-C AND 8) SUCCESSFUL WILDCATS

Callahan County: Schkade Bros. Drilling Co. 1 H. E. Clemmer, Sec. 64, T&P Sur., elev. 1,832 ft., TD 1,592 ft., IP 52.4 bbl. of oil.

Coleman County: Bells Wells Oil Co. 1 Hudson, Georgetown RR Co. Sur., elev. 1,842 ft., TD 3,639 ft., IP 95 bbl. 38°-gravity oil, 14/64-in. choke, Morris 3,137 ft.

W. J. Murray and J. L. Collins & Co. 1-A J. J. Schneider, Sec. 5, T&NO Sur., elev. 1,998 ft., TD 3,370 ft., IP 83.73 bbl. of 41.5°-gravity oil, ¾-in. choke, GOR 1,150:1.

Jones County: Bells Wells Co., et al 1 Jennie C. Green, J. Bliss Sur., elev. 1,912 ft., TD 3,424 ft., IP 83.42 bbl. 38°-gravity oil, GOR 200:1.

Runnels County: Sojourner Drilling Co. 1 Wm. Ashton, ETRR Sur., TD 2,390 ft., pay 2,383-90 ft., IP 75 bbl.

Schleicher County: Tucker Drilling Co. 1 Jeff Harkley, HG&SA Sur., Sec. 77, Blk. H., TD 6,183 ft., IP 112 bbl., 3/16-in. choke, GOR 950:1.

Scurry County: Superior Oil Co. and Intex Oil Co. 1 Eva Laws et al, Sec. 516, Blk. 97, H&TC Sur., TD 8,400 ft., IP 84 bbl. of 38.5°-gravity oil.

Stephens County: F. Kirk Johnson 2 C. K. West, Sec. 12, ETRR Sur., elev. 115 ft., TD 4,723 ft., IP 6 bbl. oil, 20/64-in. choke, GOR 1,800:1.

Sterling County: Austral Oil Exploration Co. 1 Ellwood Est., Sec. 78, Blk. 18, SPRR Sur., elev. 2,429 ft., TD 8,157 ft., IP 92 bbl. 42°-gravity oil, GOR 1,050:1.

WEST TEXAS (DISTRICTS 7-C AND 8) WILDCAT FAILURES

Andrews County: Gulf Oil Corp. 1 State "DF," Sec. 42, Blk. 7, UL Sur., elev. 2,974 ft., TD 13,424 ft., dry, Devonian 12,324 ft., Ellenburger 13,374 ft.

Borden County: Ada Oil Co. 1 Clayton & Johnson, Sec. 39, Blk. 32, T-4-N, T&P Sur., elev. 2,504 ft., dry, TD 8,200 ft.

V. A. Brill 1 T. J. Good, Sec. 14, Blk. 32, T&P Sur., elev. 2,532 ft., dry, TD 7,985 ft., Canyon 7,975 ft.

Brown County: Jack Hailey 1 Claud Parker, BBB&C Sur., dry, TD 1,020 ft.

Callahan County: A. R. Graves et al 1 R. H. Brock, Sec. 46, BBB&C Sur., TD 1,964 ft., elev. 1,996 ft.

Coleman County: Tri-M Producing Co., 1 Mary I. Dunman, James Cox Sur., dry, TD 3,568 ft., elev. 1,858 ft.

Western Petroleum Co., W. J. Murray and J. L. Collins Co. 1 J. B. McCord, Sec. 689, H. R. A. Wiggington Sur. 689, dry, TD 3,431 ft.

West Central Drilling Co. 1 J. E. McCord Est., McCord & Lindsey Sur., dry, TD 3,947 ft.

Horace White 1 S. C. Harrington, 330 ft. NL and from WL of D. Keith Sur. 64, but in Sec. 165, O. M. Keith Sur., dry, TD 3,500 ft.

Concho County: Saxon Exploration Co. 1 Edwin Glass, T. F. Benge Sur. 98, dry, TD 3,124 ft.

Crane County: Ted Weiner 1 A. M. Scott Est., 19, Blk. B-20, PSL Sur., dry, TD 4,820 ft.

Eastland County: Connally-Jackson 1 P. A. Cox, Sec. 1, Blk. 6, ETRR Sur., dry, TD 3,517 ft.

Ector County: Gulf Oil Corp. 1 Sallie Ratcliff et al, Sec. 4, Blk. 42, T-1-S, T&P Sur., dry, TD 11,000 ft.

Erath County: William D. Farley 1 R. S. Dixon, Hugh Maloy Sur. 526, dry, TD 3,871 ft.

Fisher County: Sojourner Drilling Co. 1 E. C. Kirker, Sec. 117, Blk. 2, H&TC Sur., dry, TD 6,257 ft.

Garza County: Alamo Corp. 1 Morris Neff, Sec. 89, Blk. 5, GH&H Sur., dry, TD 3,245 ft.

Hood County: De Soto Oil Co. 1 B. W. Wann, Sec. 403, Wm. Mann Sur., dry, TD 5,082 ft.

Jones County: Great Lakes Carbon Corp. 1 Oscar Woodson, Sec. 1, Blk. 2, T&NO Sur., dry, TD 2,475 ft.

J. W. Harding Trustee 1 Mattie V. Alexander, Sec. 34, Blk. 2, SPRR Sur., dry, TD 3,320 ft.

Jones & Stasney et al 1 J. M. Keen, Blk. 340, Austin & Williams Sur., dry, TD 3,457 ft.

Roark, Hooker & A. G. Hill 1 Rex Smith, Sec. 2, Blk. 2, T&P Sur., dry, TD 3,342 ft.

Kent County: El Capitan Oil Co. 1 Daugherty, Sec. 13, Blk. 1, H&GN Sur., dry, TD 6,860 ft.

Phillips Petroleum Co. 1-B Jackson, Sec. 26, Blk. 55, T&P Sur., dry, TD 4,110 ft.

Lubbock County: H. L. Cain 1 J. A. Good-

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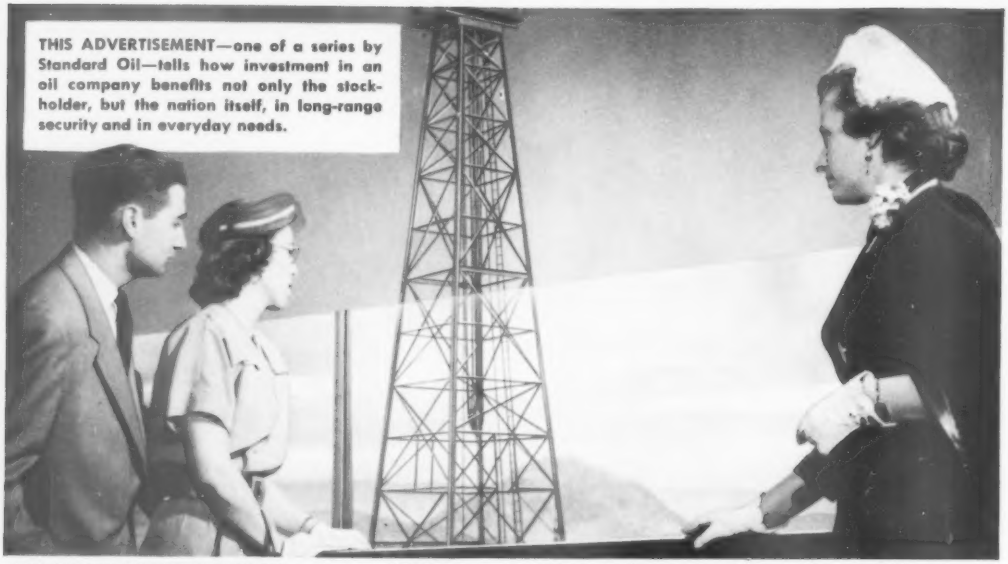

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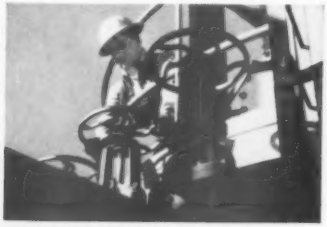

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win, Sec. 18, Blk. E, GC&SF Sur., dry, TD 4,505 ft.

Lynn County: Deep Rock Oil Corp. 1 M. C. Rackler, Sec. 1426, Blk. 18, EL&RR Sur., dry, TD 9,403 ft.

Mills County: T. J. Burgess & Ben Gast 1 W. L. Clarke, 700 ft. from NL, 1,980 ft. from EL of 195.9 ac 1st, Nacogdoches unit 298, dry, TD 652 ft.

Palo Pinto County: H. C. Knox & F. H. Clay 1 J. K. Weldon, CEPI&N Sur., A-139, dry, TD 2,206 ft.

Runnels County: E. K. & E. M. Burt and West Central Drilling Co. 1 E. J. Adami, J. C. McKean Sur. 534, dry, TD 4,487 ft.

Thos. D. Humphrey 1 E. O. Minzenmayer, A. C. Kelsey Sur. 78, dry, TD 4,802 ft.

Saxon Exploration Co. 1 Noyes Est., Sec. 170, E. Wongemann Sur., dry, TD 3,605 ft.

Shackelford County: HRH Drilling Co., 550 ft. from SEL, 170 ft. from NEL of Sec. 554, TE&L Sur., dry, TD 539 ft.

3 J. A. Robbins, 2,980 ft. from NL, 330 ft. from EL, Sec. 21, OAL Sur., dry, TD 2,504 ft.

Sutton County: Hassie Hunt Trust 1 T. W. Sandherr, Sec. 66, Blk. C, HE&WT Sur., dry, TD 8,000 ft.

Taylor County: Yucca Drilling Co. 2 Alvis Parker, Sec. 1, Blk. 129, J. McSherry Sur., dry, TD 3,456 ft.

Tom Green County: Phillips Petroleum Co. 1 Willeke, Sec. 4, BAL Sur., dry, TD 6,890 ft.

SOUTHEAST NEW MEXICO

Deepening is under way after a drill-stem test from 10,310-489 ft. in The Texas Co. 1-BA State, Section 14-12s-32e, west offset to East Caprock Devonian pool opener of northwestern Lea County and a prospective new pay opener for the pool.

Gas was at the surface in 48 minutes, open 2 hours, with recovery being 1,530 ft. of gas-cut mud. Pennsylvanian gas-distillate production was indicated from 9,920-10,078 ft.

Shell Oil Co. 1-CA State, 23-16s-36e, 1½ miles northwest of Lovington pool, was drilling below 9,874 ft. in dolomite after a 1-hour drill-stem test from 9,513-96 ft. recovered 130 ft. of drilling mud, 90 ft. of slightly sulfur water-cut mud and 60 ft. of heavily salty, sulfur water-cut mud.

Kansas

Sumner County Wildcat Shows Oil in Simpson

ANOTHER Simpson sand discovery appears to have been made in southwestern Sumner County where Mid-Continent Petroleum Corp. got a substantial gas and oil flow in a drill-stem test at its 1 Seltzer, NE SE SE 8-35-3w. Saturation was logged at 4,870-75 ft. Oil flow rate was estimated variously at up to 50 bbl. per hour. Location is west of Caldwell and the Fall Creek field, which produces fom the Simpson.

The Enterprise pool, 3 miles north of Arkansas City, in southwestern Cowley County, where the discovery well, completed in 1948, has been the only producer, has been extended a half mile northeast by Helmerich & Payne, Inc. The extension well, 1-F Wright, NE NW SE 35-33s-3e, flowed 180 bbl. of oil in two hours through open tubing. Then, placed on ¼-in. choke, it flowed at the rate of 18 bbl. of oil per hour. Pay is Bartlesville sand at 3,334-43 ft. (open hole-. The discovery well, Meade Production Co. 1 McMichael, was a small pumper. Since its completion, several unsuccessful attempts have been made to extend production.

El Dorado Refining Co. has a new discovery well in southern Ellsworth County where its 1 Andrews, NW NW NW 4-17-8, is being put on the pump following swabbing tests which produced at the rate of 2 bbl. of oil per hour. Its pay zone, Arbuckle lime, is open at 3,302-05 ft. Prior to swabbing, hole filled 2,420 ft. of oil in 36 hours. Location is 1½ miles north of the Edwards pool.

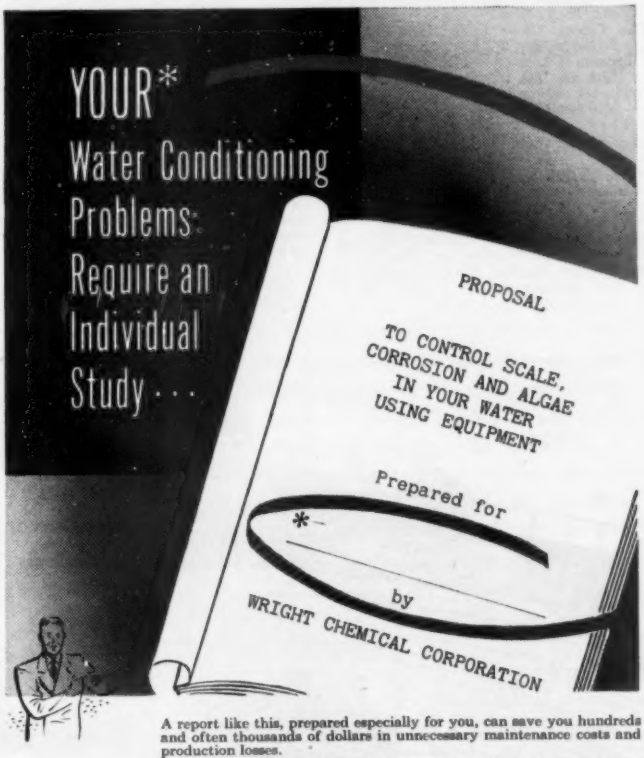
K. A. Ellison 1 Hertel, SW SW NE 1-14s-20w, a wildcat east of the Pleasant pool, in Ellis County, has been completed on the pump making 35 bbl. of oil per day from Arbuckle lime, opposite which casing is perforated at 3,864-72 ft.

Petroleum, Inc., 1-B Wilson, SE NE NE 1-15-19, southern Ellis County discovery well, swabbed 9 bbl. of oil per hour in final prepumping tests of its Lansing-Kansas City lime pay zone, opposite which casing is perforated at 3,344-46 ft. Location, a half mile from other production, is in an area circled by the Deachant, San Antonio Townsite, and Lookout Hollow pools. The well, drilled to 3,675 ft. in Arbuckle lime, failed to show in the lower zones.

A new Arbuckle producing spot is being opened ¾ mile southeast of the Laura pool, in the southwest corner of Rooks County, where B & R Drilling Co. is putting its 1 Schneider, NW NW SE 20-10-20, on the pump following a 4-hour swabbing test which recovered 20 bbl. of oil per hour. Production is from Arbuckle lime, topped at 3,667 ft. and open at 3,669-3,672 ft. There is a dry hole between the well and the Laura pool.

KANSAS SUCCESSFUL WILDCATS

Rooks County: Grant 1 Cabbage, SW SE SE 7-9s-18w, pumped 5 bbl. of oil from



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Stafford County: Shelley-Miller 1 Spangenberg, SE NE SW 26-22s-12w, pumped 253 bbl. of oil from Lansing-Kansas City 3,462-70 ft., TD 3,644 ft., PBTD 3,540 ft. (opens Pleasant Grove pool).

Petroleum, Inc., 1 Strobel "C," SE NE NW 8-22s-14w, 94 bbl. of oil from Simpson 3,852-54 ft., TD 3,893 ft. (opens Strobel Northwest pool).

Petroleum, Inc., 1 Strobel "B," CNL NW SW 9-22s-14w, pumped 100 bbl. of oil from Arbuckle 3,864-72 ft., TD 3,911 ft. (opens Strobel pool).

KANSAS WILDCAT FAILURES

Barber County: Aylward et al 1 Blunk, SW SE SW 17-34s-13w, dry, TD 5,250 ft.

Barton County: Petroleum, Inc., 1 Elmore "A," NW SE NW 23-17s-13w, dry, TD 3,346 ft.

Clark County: Vickers - Huber - Panhandle Eastern 1 Arnold, C NW NW 28-34s-22w, dry, TD 5,692 ft.

Ellis County: Globe 1 "A," NW NW SE 9-12s-18w, dry, TD 8,940 ft.

Brunson 1 Leinmiller, NE NE SW 1-12s-19w, dry, TD 3,750 ft.

Graham County: Peel Hardman 1 Setchell, NW NW NE 34-8s-25w, dry, TD 4,528 ft.

Kingman County: Cooperative Refining 1 Sheldon, SE SE SW 30-27s-9w, dry, TD 4,486 ft.

Mitchell County: Harns & Knight et al 1 Peters, SW SW SW 11-9s-7w, dry, TD 3,985 ft.

Norton County: Empire Drilling Co. 1 Gray, SW SE SE 27-3s-25w, dry, TD 3,875 ft.

Pratt County: National Cooperative Refining Association 1 Burkner, SE SE SW 25-26s-12w, dry, TD 4,581 ft.

Lion 1 Airport, SE SE SE 8-27s-13w, dry, TD 4,545 ft.

Central Area

ILLINOIS

E. A. Obering is preparing to test promising oil showings found in his 1 Morrill, a wildcat located north of Sumpter and 5 miles northwest of Carmi, in White County. Showings were in Aux Vases sand, logged at 3,181-86 ft., and on which casing has been run to 3,176 ft. A 60-minute drill-stem test of the indicated pay zone got 500 ft. of oil and 70 ft. of mud-cut oil with bottom-hole pressure of 1,300 psi. Spot location is in the NW SE SW 21-4s-9e. It is 2 miles from nearest other production.

Herndon Drilling Co. is putting its 1 Curtis, SE SE SW 27-2s-10e, new Edwards County discovery well, on the pump following swabbing tests which recovered 4 bbl. of oil per hour. Production is from McClosky lime at 3,302-15 ft. in hole drilled to 3,362 ft. Location is 4 miles southwest of Albion and a mile from other production, being northwest of the South Ellery pool and east of the Mitchell pool.

Ervin Drilling Co. is testing Benoist sand at 1,259-64 ft. in its 1 Prather, a wildcat in the NE SE NE 32-2n-2w, 2½ miles southeast of Carlyle, in Clinton County. Initial swabbing recovered ½ bbl. of oil per hour. Operators plan to shoot the sand for further tests. Location is southwest of the Huey pool.

INDIANA

A ¾-mile extension of production in the area 2 miles south of Owensville, Gibson County, is indicated by showings encountered in the O'Hara lime by John Buchman and C. E. O'Neal at their 1 Barnett-Witherspoon, NW NW NW 19-3s-11w. The prospective well flowed clean oil in a drill-stem test at 2,526-40 ft. with saturation logged at 2,533-40 ft. In the test, gas was at the surface in 3 minutes and oil in 42 minutes. Casing has been run through the zone to 2,571 ft. in hole drilled to 2,633 ft.

WESTERN KENTUCKY

Al Morris Drilling Co. 1 Sauer, a wildcat east of the Geneva pool, in northwestern Henderson County, has been completed on the pump making 68 bbl. of oil per day. It is producing from Cypress sand at 2,217-23 ft. with bottom still in saturation. Location is in 17-Q-22.

MICHIGAN

Ogma Development Co. 1 Weiler, E½ SE SW 14-22n-1e, Ogemaw Township, Ogemaw County, Richfield oil discovery well on the northwest side of the West Branch structure, was reported to be flowing at the rate of 4 bbl. of oil an hour, through a restricted choke, after acid treatment with 6,000 gal. This deeper objective wildcat in West Branch field (which is being produced from the Traverse and Dundee) was drilled to 4,239 ft., total depth. Base of Richfield, the black lime, was logged at 4,220 ft. Two pays, a light one at 4,127-35 ft., and a better section at 4,165-77 ft., were logged in the Richfield. Well was reported to be good for about 3 bbl. of oil a day natural on swab tests. It took approximately 24 hours, with pressures ranging from 1,750 to 2,000 lb. to acidize this Richfield oil discovery well. A total of 89 bbl. of load oil was employed. After being shut in for 21 hours following

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treatment, well flowed back all of the load fluids in just short of 3 hours when opened. During the next 3 hours net oil production was gaged at 60 bbl. In 7 hours the next day production totaled 71 bbl. by flowing and after this test choke was set to allow for an average flow of 4 bbl. an hour, and this continued at least through the next 18 hours with casing pressures showing at from 740 to 600 lb. and tubing pressures ranging from 340 to 300 lb.

Ogma Development was preparing to start drilling operations at the east offset to the 1 Weiler, in the W½ SW SE 14-22n-1e, while Michigan Oil Co. had announced intentions to start immediate drilling operations at the south 40-acre offset, in the E½ NE NW 23-22n-1e.

ILLINOIS SUCCESSFUL WILDCATS

Jefferson County: T. S. Doran 1 Flanagan, SE NE NE 10-3e-2e, IP 52 bbl., Aux Vases 2,548-55 ft., TD 2,555 ft. (extends Williams pool).

Magnolia Petroleum Co. 7 Eubanks-Weisenberger, SW NW NW 1-3e-1e, IP 330 bbl., Dutch Creek (Devonian) 3,663-71 ft., TD 3,750 ft. (new pay zone Woodlawn pool).

ILLINOIS WILDCAT FAILURES

Clay County: E. F. Moran 1 Lynn heirs, S½ NW SE NW 4-3n-7e, dry, TD 3,080 ft.

Clinton County: A. A. Michels 1 Bassler, C N½ SW NE 29-2n-5w, dry, TD 2,844 ft.

Otis Patillo 1 Rohlfing estate, NE SE SE 16-1n-2w, dry, TD 2,747 ft.

Macoupin County: M. Mazzarino 1-A Simmermaker, S½ NE NW NE 22-8n-8w, dry, TD 505 ft.

Montgomery County: Pure Oil Co. 1 Brockmeyer, NW SW NE 14-11n-5w, dry, TD 1,976 ft.

INDIANA SUCCESSFUL WILDCAT

Posey County: Sinclair Oil & Gas Co. 1 Roos unit, NE SE SE 22-7s-14w, IP 670 bbl., Aux Vases 2,632-38 ft., TD 2,904 ft. (new pay zone Mount Vernon pool).

INDIANA WILDCAT FAILURES

Posey County: Illinois Mid-Continent Co. 1 Will, SE NW NW 1-5s-12w, dry, TD 1,224 ft.

Kelly Sutton 1 Slygh, SE NW NW 23-6s-13w, temporarily abandoned, TD 501 ft.

Fred B. Graham 1 Juncker, SE SE NE 14-6n-13w, dry, TD 385 ft.

Spencer County: Sun Oil Co. 1 Varner, SE SW NW 31-6s-4w, dry, TD 1,036 ft.

Vanderburgh County: Calvert Drilling, Inc., 1 Wassmer-Wolf, SE SE SE 27-5s-11w, dry, TD 1,836 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: W. F. Winfrey 1 Whittinghill, SW SW NW SE 25-O-31, dry, TD 1,494 ft.

Henderson County: L. P. Galambos et al 1 Dorsey, W½ SW SW SE 19-Q-21, dry, TD 2,775 ft.

Great Lakes Carbon Co. 1 Heppler, NW SW NE SW 7-Q-27, dry, TD 1,925 ft.

Basin Drilling Co. and J. Buchman et al 1 Bright-Walmsley, W½ SE NW NW 21-D-25, dry, TD 2,233 ft.

Sun Oil Co. 1 Dixon-Cosby, SE SE NE 15-O-26, dry, TD 2,240 ft.

Hopkins County: White & Vickery 2 Poe, SW SE NE NE 11-I-21, dry, TD 650 ft.

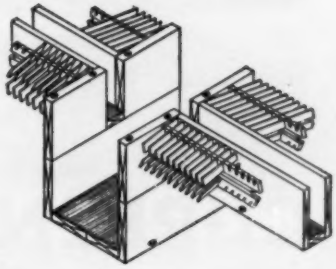
White & Cickery 1 Meadows, NW NE SE SW 1-H-22, dry, TD 862 ft.

McLean County: J. C. Miller and Ashland Oil & Refining Co. 1 Osborne, NE SW NE NE 7-L-27, junked hole, TD 1,515 ft.

(Continued on page 191)

less water loss . . .

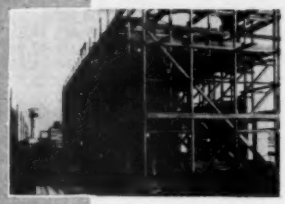
with WCEC *Patented* Drift Eliminators



Our newly designed multiple effect type, patented drift eliminator system, effectively and efficiently removes the entrained moisture carried by the air as it leaves the tower. Constructed entirely of Redwood, the eliminator blades are separated by spacers so arranged that the blades are free to expand and contract, with any possible stress caused by warping thereby being avoided. No metal nails or fastenings are used in this construction. WCEC patented drift eliminators result in less water being lost from your cooling tower.

SEE OUR CATALOG IN SWEET'S FILE

TOWERS OF STRENGTH WCEC



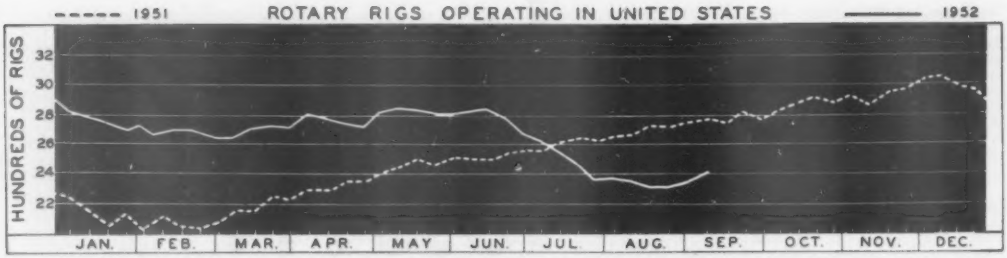
Induced draft cooling tower, during construction, at Ford Motor Co., Aircraft Engine Division, Chicago, Illinois. Other WCEC towers at Brown Shoe Co., St. Louis, Mo., Sikorsky Aircraft Co., Bridgeport, Conn., Liquid Carbonic Co., Belleville, N. J.

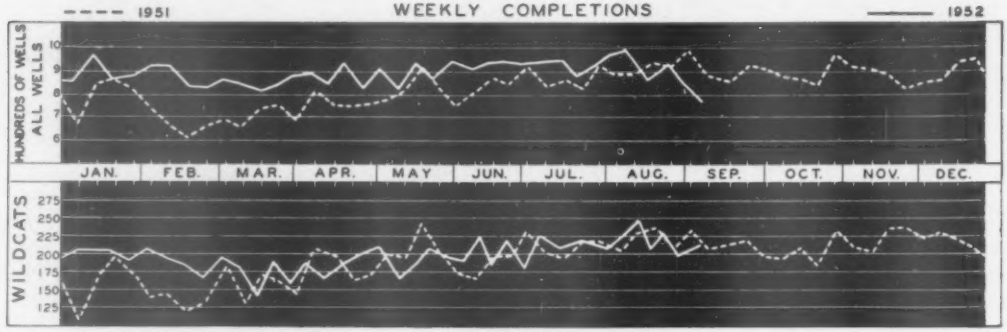
WATER COOLING EQUIPMENT COMPANY

MAIN OFFICE • New Hampshire Ave. and Weber Road • St. Louis 23, Mo.

Fabricating Plants: St. Louis, Mo. • Arcata, Calif. • Houston, Texas

REPRESENTATIVES IN TWENTY-EIGHT PRINCIPAL CITIES





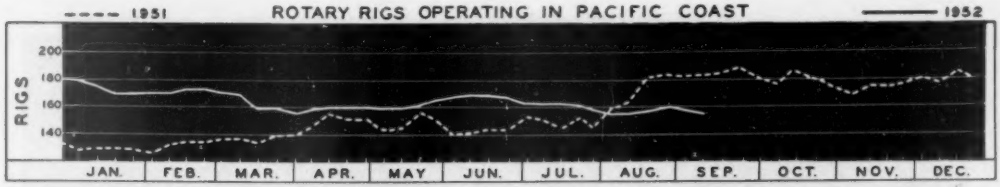
CURRENT STATISTICS

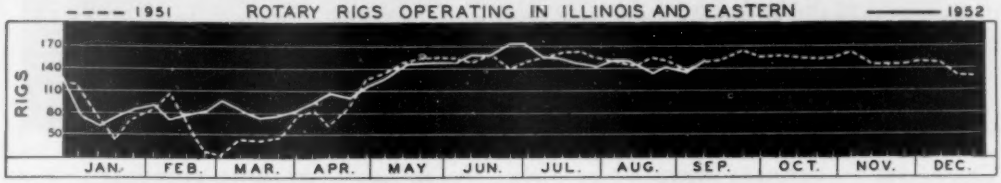
EXPLORATION

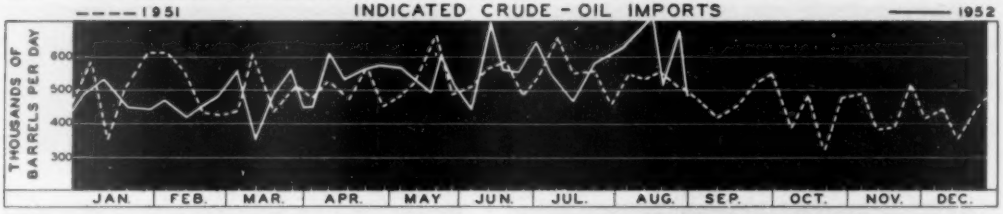
WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 6, 1952

	Total of all wells					Sept. 6		Wildcat completions and discoveries					Cumulative total, 1952				
	Comp.	Oil	Gas	Dry	Footage	1952	1951	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	18	9	0	*9	26,375	524	450	0	0	0	0	0	0	0	0	2	2
Pennsylvania	47	21	5	†21	86,200	1,331	1,152	0	0	0	0	0	0	0	0	2	2
West Virginia	9	0	8	1	24,864	432	397	0	0	0	0	0	0	0	2	5	7
Ohio	21	10	3	§8	42,038	694	644	0	0	0	0	0	2	0	7	16	25
Indiana	17	8	0	9	26,259	851	848	1	0	0	5	6	25	0	2	244	271
Kentucky	24	9	0	15	39,456	882	819	0	0	0	11	11	16	0	1	178	195
Illinois	36	18	0	18	90,472	1,329	1,663	2	0	0	5	7	14	0	0	376	390
Michigan	18	7	0	11	48,133	498	545	0	0	0	2	2	21	0	4	164	189
Kansas	59	32	3	24	206,289	3,229	3,025	4	0	0	11	11	75	0	10	519	604
Nebraska	8	0	0	8	37,777	200	155	0	0	0	6	6	7	0	2	110	119
Oklahoma	101	51	9	‡41	450,407	4,013	3,868	1	0	2	12	15	77	2	10	423	512
Texas	258	97	20	141	1,353,341	12,170	11,462	16	0	2	83	101	552	39	86	2,632	3,309
North Central (Dist. 7-B & 9)	65	21	0	44	230,600	3,814	3,475	5	0	0	18	23	308	2	23	1,090	1,423
West (Dist. 7-C & 8)	75	30	1	44	500,100	3,776	3,461	9	0	0	35	44	124	0	5	492	621
Panhandle (Dist. 10)	14	4	9	1	45,000	480	847	0	0	0	0	0	4	0	6	35	45
Eastern (Dist. 5 & 6)	15	10	0	5	80,100	663	496	0	0	0	5	5	15	4	2	159	180
Gulf Coast (Dist. 2 & 3)	46	15	3	28	292,736	1,801	1,583	1	0	2	17	20	57	23	23	378	481
Southwest (Dist. 1 & 4)	43	17	7	19	204,805	1,636	1,600	1	0	0	8	9	44	10	27	478	559
Louisiana	50	27	5	18	339,994	1,585	1,439	3	2	0	11	16	31	17	11	211	270
Northern	29	13	2	14	116,608	859	778	0	0	0	9	9	12	0	7	101	120
Southern	21	14	3	4	223,386	726	661	3	2	0	2	7	19	17	4	110	150
Arkansas	9	3	0	6	35,269	269	273	0	0	0	5	5	5	0	0	56	61
Mississippi	8	3	0	5	52,464	242	240	0	0	0	4	4	13	2	1	111	127
Southeastern States	3	2	0	1	17,751	46	37	0	0	0	1	1	3	0	1	25	29
Montana	8	5	1	2	35,035	206	141	1	0	0	0	1	5	0	1	48	54
Wyoming	6	4	0	2	21,574	465	487	0	0	0	2	2	18	0	3	77	98
Colorado-Utah	8	3	0	5	38,592	351	178	0	0	0	5	5	17	0	7	143	167
New Mexico	16	9	4	3	106,159	722	444	0	0	0	0	0	26	2	1	72	101
California	49	36	0	13	224,435	1,678	1,535	1	0	0	13	14	58	0	5	328	391
North Dakota	1	1	0	0	8,600	50	3	0	0	0	0	0	3	0	0	15	18
Miscellaneous (Md.)	1	0	1	0	3,689	52	73	0	0	1	0	1	0	0	19	20	39
Total United States	775	355	59	361	3,315,173	31,819	29,878	29	2	5	176	212	968	62	173	5,777	6,980
Total previous week	852	405	87	360	3,375,639			18	2	7	167	194	939	60	168	5,601	6,768
Total September 8, 1951	892	510	58	324	3,429,796			31	1	3	172	207	1,019	51	177	5,396	6,643

Service wells included: *9, †18, ‡3, §2.



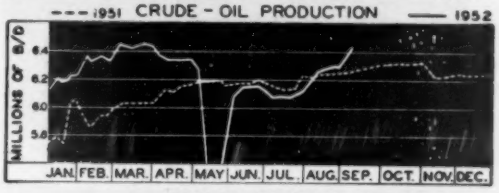


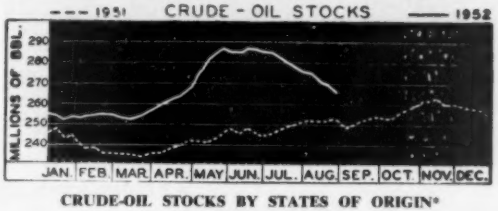


DAILY AVERAGE PRODUCTION FOR WEEK

	September 6, 1952			Aug. 30
	Crude oil	Lease condensate	Total	total
Alabama	2,800		2,800	2,900
Arkansas	75,050	600	75,650	75,750
California	987,100		987,100	988,000
Colorado	83,800		83,800	86,600
Eastern	57,000		57,000	57,000
Florida	1,575		1,575	1,650
Illinois	167,500		167,500	167,700
Indiana	34,600		34,600	33,800
Kansas	322,700		322,700	325,400
Kentucky	32,400		32,400	32,300
Louisiana	640,350	27,100	667,450	663,475
North	109,600	2,100	111,700	114,350
South	530,750	25,000	555,750	549,125
Michigan	35,600		35,600	39,100
Mississippi	92,600	3,350	95,950	96,500
Montana	25,200		25,200	25,000
Nebraska	7,100		7,100	6,900
New Mexico	163,800	400	164,200	160,800
Oklahoma	529,500		529,500	531,400
Texas	2,906,300	41,500	2,947,800	2,790,850
Dist. 1	34,825	150	34,975	33,300
Dist. 2	166,850	3,750	170,600	154,950
Dist. 3	473,900	23,500	497,400	470,850
Dist. 4	264,500	4,900	269,400	249,350
Dist. 5	49,325	200	49,525	45,400
Dist. 6	123,125	3,500	126,625	121,425
East Texas field	270,300		270,300	263,000
Dist. 7-B	103,775	50	103,825	98,050
Dist. 7-C	165,800	4,950	170,750	153,625
Dist. 8	989,250	200	989,450	940,075
Dist. 9	182,175	300	182,475	178,725
Dist. 10	82,475		82,475	82,100
Utah	4,800		4,800	4,900
Wyoming	183,000		183,000	186,000
North Dakota	6,500		6,500	5,500
Total U. S.	6,359,275	72,950	6,432,225	6,281,525
Change from previous week, up			150,700	
Canada	157,925		157,925	206,000
Total U. S. production January 1-September 6			1,527,765,072 bbl.	
Same period last year (crude plus cond.)			*1,523,508,450 bbl.	

*Includes 20,338,250 bbl. condensate.



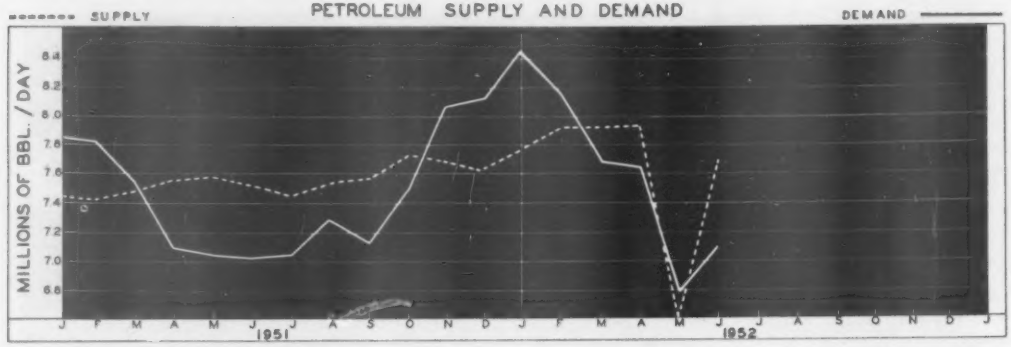


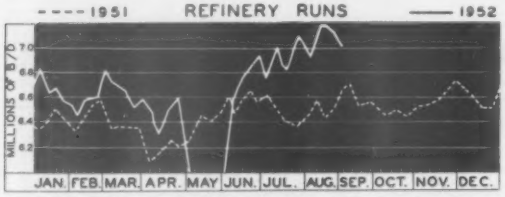
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

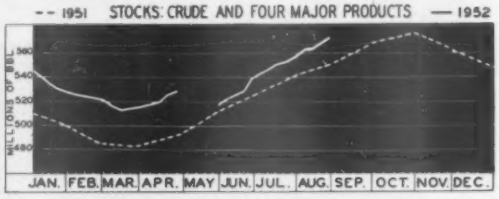
(Thousands of barrels)

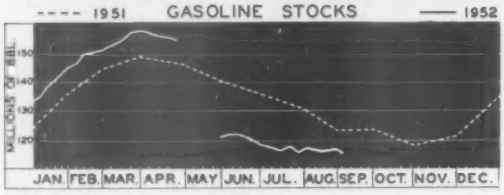
	Aug. 30, '52	Aug. 23, '52	Sept. 1, '51
Pennsylvania Grade	2,376	2,385	2,091
Other Appalachian	2,145	2,150	1,666
Illinois, Indiana, Michigan	13,172	12,673	11,380
Arkansas	3,168	3,109	2,514
Louisiana	14,792	14,523	14,645
North	2,404	2,352	2,756
Gulf	12,388	12,171	11,889
Mississippi	3,696	3,660	2,681
New Mexico	7,480	7,451	6,417
Oklahoma and Kansas	38,907	39,354	38,420
Texas	127,606	129,829	120,963
East Texas proper	13,183	13,241	(†)
West Texas	56,051	57,784	(†)
Texas Gulf	26,794	27,065	(†)
Other Texas	31,578	31,739	(†)
Rocky Mountain	14,347	14,612	13,049
California	31,315	30,584	30,357
Foreign	7,581	8,861	7,975
Total	266,585	269,191	252,158

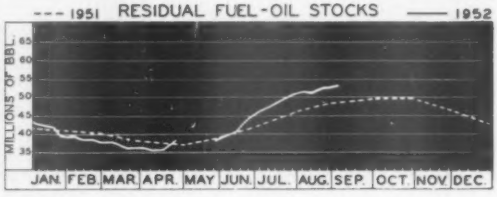
*Bureau of Mines. †Not comparable with current week.









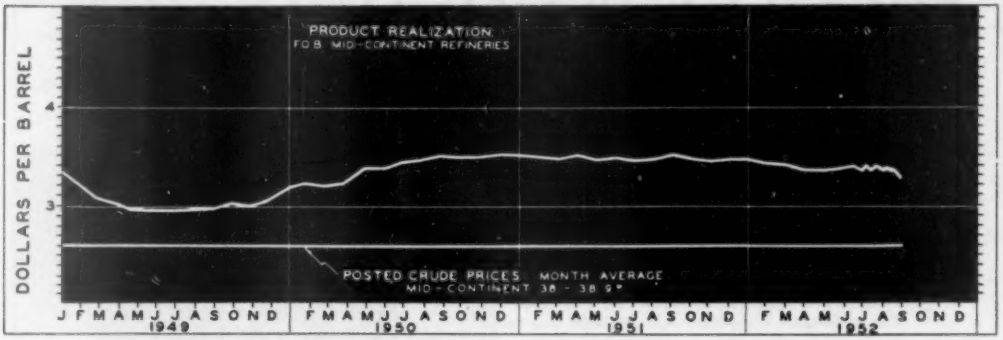


A.P.I. REFINERY REPORT, SEPTEMBER 6

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, September 1951 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,086	422.3	53.7	267.8	238.2	29,260	14,347	39,830	12,717	1,057	422.7	46.5	260.7	220.4
Appalachian:														
District 1	109	41.6	4.0	17.3	12.9	3,610	632	1,548	805	106	48.1	5.1	14.7	9.3
District 2	64	38.6	0.7	11.9	17.0	1,872	304	560	406	68	35.4	3.1	9.9	13.4
Ind., Ill., Ky.	1,320	711.3	72.7	240.7	170.0	24,459	7,461	21,705	6,789	1,174	619.0	74.0	191.6	152.3
Okla., Kans., Mo.	602	333.8	14.0	151.6	64.0	11,168	1,948	12,698	1,614	518	296.1	17.4	123.8	59.0
Inland Texas	246	171.0	13.3	51.3	37.4	4,047	494	2,089	1,057	253	176.5	13.3	39.4	42.2
Texas Gulf Coast	1,737	758.8	140.4	431.1	257.7	16,208	4,055	10,774	8,142	1,580	726.7	121.3	322.3	248.9
La. Gulf Coast	503	250.6	55.6	136.1	64.0	6,314	2,619	3,708	2,091	513	247.9	59.7	121.9	59.2
N. La. and Ark.	88	34.1	8.1	20.9	5.6	2,799	712	965	217	75	30.9	6.9	15.5	7.0
Rocky Mountain:														
New Mexico	16	9.1		2.4	3.4	92		70	32	14	8.7	.3	1.5	3.8
Other Rocky Mtn.	252	120.6	5.6	48.6	47.1	3,000	474	2,205	1,291	219	99.7	6.9	40.7	42.0
California	979	425.3	2.0	136.3	343.0	14,001	328	10,174	18,113	981	415.2	9.4	139.8	370.6
September 6, 1952	7,002	3,317.1	370.1	1,516.0	1,260.3	116,830	33,374	106,326	53,274	6,558	3,126.9	363.9	1,281.8	1,228.1
August 30, 1952	7,110	3,419.4	380.6	1,464.7	1,262.7	117,240	32,080	102,295	52,296					
September 8, 1951	6,705	3,162.3	374.3	1,247.4	1,266.4	124,584	34,400	97,219	49,458					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
4
3
POSTED CRUDE PRICES, MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.26 for week ended August 30, $3.29 for previous week, and $3.48 for August 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of September 10, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¾-10½	12.125-12.7*	10¾-11
Premium gasoline, 86-88 octane	11¾-11½	13.25-14.0	11¾-12
42-44 w.w. kerosine	8⅝-9	10.4-10.65	9-9.25
No. 2 straw fuel oil	7⅝-8	9.4-9.65	8-8.25
No. 6 residual	$0.90-1.00	$2.10-2.25	$1.50-1.75

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅞	6¾	6⅝
Grade 18-55	8.25	7.75	8.0

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	27-28
200 vis., No. 3 neutral, 0-10 pp.	14.5-15.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX
Mid-Continent

132-134 A.M.P.	5.5

THE trend toward firm markets for kerosine and distillate fuels on the East Coast and in the Mid-Continent seems to be the result of plans to meet high demands during the heating season rather than any encouraging movement to consumers within the past few weeks.

Indicated refinery demand for distillate fuels in Districts 1 and 3 for the 4-week period ended August 30 was about 3 per cent less than in the same period last year. Weekly data indicate that deliveries were up in District 2 but the total for Districts 1, 2, and 3 was about the same as last year.

On the other hand, stocks of distillates in the three districts at the end of August were up a little more than 7,000,000 bbl. from the same time last year. Distillate inventories in these districts have increased 46,000,000 bbl. since the strike period compared with a gain of 33,000,000 bbl. last year.

Current reports from District 2 indicate that most of the movement of light fuels in the past few weeks has been against contracts, some of it involving exchanges between primary suppliers at pipe-line terminals.

Spot rates for dirty tankers are a little firmer than they were a week ago. At the end of the first week of September, rates ranged between 5 and 10 per cent over the Maritime Commission base, up about 5 per cent. Clean tankers were off slightly to about MC plus 30 per cent.

Gasoline continues strong in all areas, but some suppliers believe that the strength is due to the necessity for meeting demand out of current production because of the loss of stocks during the strike. Indicated demand for refinery-produced gasoline for the 4 weeks ended August 30 was only 1.6 per cent greater than for the same period last year. Stocks on August 30 were about the same as on July 19.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico.

Last general price change represented a 50-cent increase, effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.	
Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

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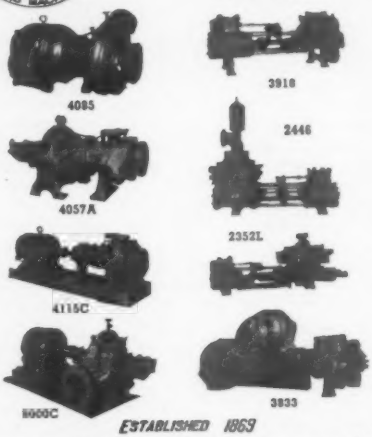

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EQUIPMENT MEN . . . in the News

Hudson Engineering Corp. Opens New York Office

Edward Reichhelm has been appointed manager of the recently established eastern sales and export office of Hudson Engineering Corp.

Reichhelm attended Colgate University, and for the past 20 years has engaged in engineering, and sales of process equipment to the petroleum and chemical industries in the New York area. He previously was with the New York sales office of Alco Products Division of American Locomotive Co.

Hudson Engineering Corp., of Houston, designs and constructs oil and gas processing plants and manufactures industrial water-cooling towers, air-cooled heat exchangers, and atmospheric-type coolers.

Johnson-Heyck Represents Superior Combustion

C. D. JOHNSON

T. R. HEYCK

Superior Combustion Industries, Inc., of New York City, has announced the appointment of Johnson-Heyck, Inc., Houston, as sales representatives to handle the sales of Superior heat exchangers in Texas.

Curtiss D. Johnson has been engaged in the sale of industrial machinery and heat exchangers for many years.

Ted R. Heyck is a graduate engineer, a registered professional engineer of Texas, and a member of the Texas and National Society of Professional Engineers.

In addition to Superior heat exchangers, Johnson-Heyck also handles the products of the following companies: Aurora Pump Co., Barksdale Valves, Eastern Industries, Inc., The Engineer Co., Joy Manufacturing Co., Sier-Bath Gear & Pump Co., Vulcan Soot Blower Co., and Wagener Steam Pump. Co.

McCullough Names Haskell Service Engineer in Canada

R. E. HASKELL

Appointment of R. E. (Ernie) Haskell, Canadian geologist, as service engineer in charge of radiation well logging in Canada, was announced recently by I. J. McCullough, president of McCullough Tool Co. Haskell will operate out of the McCullough divisional headquarters at Edmonton, Alta.

Haskell has been instrumental in the development of the new McCullough scintillometer, the first gamma-ray counter designed specifically for geological use. The McCullough scintillometer is a development of Dr. G. M. Brownell, Dr. Robert Pringle, and Dr. Kenneth Roulston, leading Canadian physicists and geologists.

Haskell holds a bachelor of science degree in geology from University of Manitoba. He has arrived in Canada with a new special logging truck, completely equipped. Facilities of the new truck include complete instrumentation for gamma-ray and neutron logging, and an Ozalid machine for making duplicate logs.

Cecil McNutt Joins Tulsa Engineering Sales

CECIL McNUTT

Clyde B. Fisher, president of Tulsa Engineering Sales Co., has announced the affiliation of Cecil McNutt, formerly with McCormick Machinery Co. Tulsa Engineering Sales is distributor for Dodge Manufacturing Co., power-transmission equipment and B. F. Goodrich industrial rubber products, and now presents its own line of Shurway oil-field specialties, featuring a new load binder, a time-control switch, and a vapor-control hatch valve.

Tellepsen Announces Executive Appointments

The recent expansion of the petroleum and chemical division of Tellepsen Construction Co., of Houston, has resulted in the appointment of several men to executive positions in that division, according to Howard T. Tellepsen, president.

Emory E. Gose, Jr., vice president and treasurer of the company, has been named division director. Gose joined

H. M. ANDERSON

L. S. DeWITT

O. L. CARSON

J. S. BLEAKIE

Tellepsen in 1937, and since 1942 has served in the capacity of officer and director.

H. M. Anderson has been named chief engineer. During the past 6 years he has been assistant chief engineer of Brown & Root's petrochemical division, and has been connected with the building of major transmission systems and compressor facilities. Formerly Anderson was associated with Fluor Corp. for 9 years on major projects in the Middle West and on the Pacific Coast.

A graduate engineer of Missouri School of Mines, Lyle S. DeWitt has been appointed manager of the construction section. He has supervised construction of pipe lines, compressor stations, utilities, and industrial plants for such organizations as Ohio Fuel Gas Co., Shell Oil Co., Texas Eastern Transmission Co., Socony Vacuum Oil Co., Inc., and Northern Natural Gas Co.

Sales manager of Tellepsen's petroleum and chemical division will be O. L.

(Kit) Carson, an Oklahoma University engineer. He has worked with Barnsdall Oil Co. and National Supply Co. and has served as division manager or chief engineer on major construction for Panhandle Eastern Pipe Line Co., Fluor Corp., Phillips Petroleum Co., and Graver Construction Co.

Paul F. Wolfinger, a graduate of Oklahoma A. & M., will assist Carson as sales engineer. Since 1944 Wolfinger has supervised compresser-station facilities, specializing in natural-gas and hydrocarbon facilities.

Joseph S. Bleakie has been appointed chief estimator of the estimating and analytical section. Bleakie was previously employed by the Austin Co., Lummus Co., and Girdler Corp. He holds a B.S. degree from Harvard.

R. D. Walker Assigned to Weatherhead Sales Post

R. D. WALKER

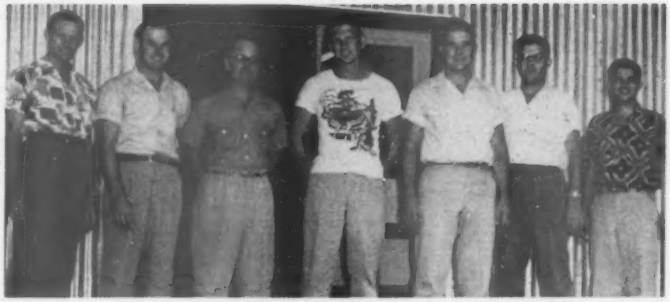
Robert D. Walker was recently appointed to The Weatherhead Co. staff of industrial sales engineers and will handle sales of Weatherhead Ermeto tube fittings and a full line of other types of tube fittings and hose assemblies. He will cover Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. The announcement was made by A. D. Hodge, industrial division sales manager.

Walker has 20 years' experience in many phases of hydraulics, gained during his association with drilling contractors in the Texas and South American oil fields.

Refinery Engineering Co. Forms Gulf Coast Affiliate

T. M. Lumly, president, Refinery Engineering Co., has announced the organization of Southern Refinery Engineering Co., with headquarters in Houston. President and general manager of the Texas affiliate is John H. Schurman, who has been associated with Refinery Engineering for several years. Lumly is vice president of the new firm.

Southern Refinery Engineering will engage in the engineering, design, and construction of refineries, catalytic cracking units, chemical plants, gasoline plants, pumping stations, and other similar and associated installations. Key administrative and engineering personnel of Refinery Engineering Co., will function in advisory and consulting capacities.



Mid-Continent Opens New Store in Seminole

Personnel at Mid-Continent's new Seminole store are W. H. Haney, H. R. Gamble, T. R. Wilson, W. P. Wrenn, Jr., J. D. Brown, Jr., D. E. Rowe, and S. L. Rooker.

A new store in Seminole, Okla., has been announced by President Ken W. Davis, of Mid-Continent Supply Co., from the Fort Worth general offices of the organization.

The new Mid-Continent store in Seminole is on U.S. Highway 270 a half mile north of the Seminole business district. An important feature of the location is the 10,000-sq. ft. paved parking area around the store.

W. H. Haney is manager of the Seminole store. Field salesmen are D. E. Rowe and T. R. Wilson. Storemen include J. D. Brown, H. R. Gamble, D. O. Jackson, and S. L. Rooker. The Seminole store is under the district managership of J. P. Alexander in Oklahoma City, and comes under the supervision of division manager S. R. Clinkscales and assistant division manager A. T. Skaer in Tulsa.

Italian Engineers Visit National Tank Co. Plant

Dr. Alberto Clerici, Azienda Generale Italiana Petroli (AGIP), and Dr. Franco Salimbeni, Societa Nazionale Metandotti (SNAM), both of Milan, Italy, are shown as they visited the Tulsa plant of National Tank Co. Clerici and Salimbeni are in the United States visiting oil fields, processing operations, and the plants of manufacturers of petroleum industry equipment. AGIP is a large, Italian-owned oil company and SNAM is a pipe-line subsidiary.

Dr. Alberto Clerici and Dr. Franco Salimbeni.

Peterson Advanced to Industrial Sales Head

The appointment of C. L. Peterson as general sales manager of the industrial division of Minneapolis-Honeywell Regulator Co. was announced recently by L. Morton Morley, vice president of the division.

Peterson has been regional manager for Honeywell's midwest region in Chicago since January 1950. He succeeds W. H. Steinkamp.

An engineering graduate of University of California, Peterson joined the company in 1927 as sales engineer in the San Francisco office. In 1945 he was appointed regional manager for the parent company's Pacific region.

Procon Announces Election of Officers

John C. Raaen, recently elevated to the post of chairman of the board of directors of Procon, Inc., petroleum-refinery construction firm of Chicago, has announced the election of officers at a board meeting held early in August.

Carl B. Whyte, formerly executive vice president, was made president. A. G. Petkus and J. C. Reed were elected vice presidents.

(Continued on page 190)

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EQUIPMENT FOR SALE

FORT Worth model-D spudder complete with International power unit, tools for 22" diameter holes, $4500. Located near Los Alamos, New Mexico. Inventory furnished upon request. Texas Water Wells, Inc., 951 McCarty Drive, Houston, Texas.

BUCYRUS-ERIE 28-L, trailer mounted, in first-class condition with 65-ft. telescoping derrick complete with casing tackle, strut, auxiliary A-frame leg, and 4-sheave casing blocks. Powered by D-315 Caterpillar Diesel. Price $12,000.00. BUCYRUS-ERIE 24-L, trailer mounted in first-class condition with 55-ft. telescoping derrick. Powered by HP-326 Buda gasoline engine. Price: $5,000.00. Duval Drilling Co., 6305 Normandy Blvd., phone 8-5711, Jacksonville, Fla.

FOR SALE: Cardwell Model "R" Drilling outfit consisting of double drum draw works, powered D-13000, skid mounted 7¼ Oilwell pump, powered D-17000, mast is ninety foot bender, subbases, 10 KW light plant, Linkbelt shaker, steel dog house, traveling blocks, swivel, tongs and rotary table. Write for complete inventory—The Ralph M. Parsons Company 617 South Olive Street, Los Angeles 14, California.

FOR SALE: 5,000 8⅝" O.D. Used 8-V recessed couplings off of 28.55# pipe that is clean, the dutchmans having been removed with a machine thread in perfect shape. Will sell any part for $1.50 each F.O.B. Shreveport, La. Contact A. A. Gilbert Pipe & Supply Co. P. O. Box 986 or Phone L. D. 97.

FOR SALE
USED PUMPING GAS ENGINES

16—Allis-Chalmers 4 cyl. type W-25.
18—Buda 4 cyl. type HP-217.
17—Hall Scott 4 cyl. type 167.
29—Minn. Moline 4 cyl. type KEF.
7—Minn. Moline, 4 cyl. type 206-A-4-A.
10—Minn. Moline 4 cyl. type 185-4-A.
30—Other miscellaneous makes and types, some 6 cylinder. All in running condition when removed from wells. A majority of the above have Twin Disc industrial clutch, magnetos, electric starters with cannon receptacles and oil filters. All for skid or slide rail mountings. Engines available due to electrification of pumping units.

USED DRILLING EQUIPMENT

5—12" x 12" twin drilling engines.
1—11" x 11" O.W. twin drilling engine.
4—12" x 12" single drilling engines.
3—14" x 14" twin drilling engines.
1—66" Ideal type C, 4 Sheave traveling block.
1—9" Ideal casing hook.
6—15½" x 8½" x 20" Ideal slush pumps.
3—16½" x 7¾" x 20" O.W. slush pumps.
1—14" x 7¼" x 14" Ideal slush pump.
6—14" x 7¼" x 14" G.D. slush pumps.
2—10" x 5" x 10" Ideal feed pumps.
4—10" x 4½" x 10" O.W. water feed pumps.
2—7" x 4½" x 10" O.W. water feed pumps.

All above sold "As is—Where is."

STANDARD OIL COMPANY OF CALIFORNIA
P & S Dept.—Taft, California
Attn.: P. A. Cline—Phone Taft 5-2111 or write or wire

EQUIPMENT FOR SALE

FOR SALE at Oklahoma City, Attention, T. P. Mace. 40,000' each, 3" and 4" standard, plain end, beveled line pipe, cleaned outside. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE at shut down Gasoline Plant in Kansas, 1 No. 5-WDH-5, BS&B Gas Dehydrator, complete. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE at Great Bend, Kansas—Approximately 5,000' 4" O.D. Drill Pipe with Lone Star Tool Joints. Prime Drilling Company, 1516 Liberty Bank Building, Oklahoma City, Oklahoma.

FOR SALE: 12 New, Western Supply Company Water Coolers, Bf-3-51 horizontal Atmospheric sections, 963-sq. ft. surface, with 153—1" OD x 18 BWG x 24' Admiralty tubes, safe WP-125 psi. at 300° F. Test 188 psi. Located Edmond, Oklahoma. Contact Sohio Purchasing Office, Oklahoma City, Oklahoma. Phone Re-9-0512.

FOR SALE in the Seminole area, one 20' x 40' x 18' Stefco sectional steel, corrugated iron building, erected, $1750.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

PACIFIC
Centrifugal Pumps

41 — 16" Type DMB, 10,000 GPM, 35' Head, 870 R.P.M.

3 — 4" Type IMB, 900 GPM, 1380' Head, 3505 R.P.M.

Write — Wire — Call

Newman's Inc.
Tulsa, Okla. P. O. Box 1865 Ph. 25228—LD 635

Used Seamless
BOILER TUBES

2" O. D.
2¼" O. D.
3¼" O. D.
3½" O. D.
4" O. D.
5⅜" O. D.
5½" O. D.

Approximately 5 miles of each diameter available in single or double random lengths with beveled ends.

Write—Wire—Phone

SONKEN-GALAMBA CORPORATION
2nd and Riverview (X851)
Kansas City 16, Kansas
THatcher 9243

EQUIPMENT FOR SALE

1—Wilson Giant Rotary Rig 800 Transmission. 2—L. I. Cummins Diesel Motors. 1—7¼ x 14 Pump. 1—96' Moore Hi-Speed Mast Rig Complete. 15,000' 4½" O. D.—9.50 lb. Range 1 Casing, New. Box E-936, The Oil and Gas Journal, Tulsa, Oklahoma.

LATE Model GUMBO BUSTER, 21" Rotary Table. Excellent Condition. $2,750.00. Write or Wire: Blalack & Walter Drilling Company, P. O. Box 1309, Longview, Texas. Phone 5744.

7000 FT. 2⅛" Upset seamless tubing with ⅝" and ¾" rods. This tubing has been dialogged; in excellent condition. Jay Kornfeld, 1121 Union National Bank Building, Wichita, Kansas. Phones 42121, 60996.

FOR SALE: Near Maud, Okla., horizontal gasoline storage tanks as follows: Two 10' x 30', Four 8' x 30', One 8' x 25', One 7' x 27'—disconnected and ready for truck movement. For data, contact Cities Service Oil Co. Patridge, Bartlesville, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-30 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

GAS ENGINE GENERATING UNITS

5—Bruce-McBeth, Model G-5, 175 HP, 5 cylinder, 600 RPM, Gas Engines direct connected To
5—Westinghouse, AC, 125 KVA, 3/60/460 volts, 600 RPM Generators, belted exciters.
Lube Oil cooler, Burgess Exhaust Snubbers, lighting and Panelboard. Units complete.

C. J. SMITH
Oil Capital Building
Tulsa 3, Oklahoma
Telephone 5-3418

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Clean, Straightened & Beveled, Double Jointed or With Couplings.
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APPROXIMATELY 350 miles—8⅝" OD Line Pipe—28.55#, .322 Wall.
APPROXIMATELY 30 miles—12¾" OD Line Pipe—50#, .375 Wall.

Phone, Write, Wire

CONSTRUCTORS' MATERIAL & EQUIPMENT COMPANY
General Delivery, Phone 95, Mexico, Mo. Box 3216, Phone 8-3376, Tulsa, Okla.

EQUIPMENT FOR SALE

FOR SALE: One model R Cardwell double drum hoist Serial No. RLGMD-687 powered by Model GK-145 Waukesha engine. New, never been used. Factory list price plus trucking and insurance. Fox Well Servicing Co., Box 488, Healdton, Okla. Phone 905.

ONE 36 L Bucyrus-Erie Drilling Machine complete with 7" and 5" Tools, Tool Rack, Light Plant, Dog House, all complete, good lines, ready to go. Will sell right. Will give guarantee same as new unit. Write Texas Well Servicing Company, Box 1357, Borger, Texas. Phone 1721.

FOR SALE: One 36-L Bucyrus-Erie drilling machine, complete with tools. Also 1,942 ft., new 7 inch, 17 lb., H-40, range 2, seamless casing and 2,409 ft. of new 2⅞ inch, 4.60 lb., range 2, J-55, seamless regular tubing. Box E-812, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE near Madison, Kansas, approximately 20,000' each of ⅝" and ¾" sucker rods, reclaimed from water flood project being developed and suitable for re-use. ⅝" rods 10c per foot and ¾" rods, 15c per foot. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE erected at our Stone Gasoline Plant, recently shut down near Burrton, Kansas, a number of sectional steel, corrugated iron buildings. List and prices available upon request. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE: Failing "1500" Holemaster powered by Chrysler industrial power unit, mounted on 1942 GMC truck. Rig complete with mud pump, 1,000' of "N" rods, drill collar and core barrel, slips, elevators, subs, etc. Equipment showing very little use. 1—1942 GMC water truck, A-1 condition. For inventory contact P. O. Box 409, Del Rio, Texas.

FOR SALE: R. L. Cardwell with HXE Hercules Engine, 1st class condition, $6,500.00. Fred Cooper E 563 Winch Tractor, Single Drum mounted on six 75-inch Tires, 50 ft. mast, fine condition service 5,500 feet of 2½ inch upset tubing. Box 1215, Tulsa, Phone 5-8850.

FOR SALE

DOUGLAS DC-3

(Converted C-47)

CUSTOM INTERIOR

PRIVATE COMPARTMENT

Divans — Swivel Chairs

TOTAL HOURS TO AUGUST 20, 1952

Airframe	3038
R/H Engine	415
L/H Engine	280

P&W R-1830-92 Engines—Hamilton Standard 6353A-18 Propellers

RADIO EQUIPMENT: 1 each: 51R-1 Omni-ILS Receiver, 51V-1 Glideslope Receiver, 51R-1 Communications Receiver, 17L-2 Transmitter, RA10DD Range Receiver with Loop, MN5313 Marker Receiver, AVQ-6 Radar Altimeter, 18S-3 Transceiver (Radio Telephone), 2-MN62A ADF's with MN60A Loops.

EQUIPMENT INCLUDES: C-2 Gyrosyn, CO_2 Warning Signal Unit, Cabin Radio & Paging System, A-3 Autopilot, Airstair Door.

BOX E-969

THE OIL AND GAS JOURNAL

Tulsa 1, Oklahoma

EQUIPMENT FOR SALE

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

NEW G-M 6-71 Diesel; installed but never used. Flywheel for Twin Disc 10,000 Series torque converter. Will sell for less than O.E.M. price. Muskogee Iron Works, Muskogee, Oklahoma.

FOR SALE: Used 36-L "Bucyrus-Erie" Drilling Unit, Bare Machine with Casing Tackle Strut, now in use, will be available October 1st. E. K. Carey, Contractor, Box 620, McPherson, Kansas. Phone 241.

6,000' OF 4½" API. Full Hole Sonoscoped Drill Pipe, Also 4,000' of 3½" External EUE Drill Pipe. Milford Giffin, Tel. 477, Hoisington, Kansas.

FOR SALE: One Wilson Mogul Double Drum Spudder equipped with rotary drive attachment, chain driven transmission, friction clutches in both drums, lower drum with two drives, upper drum with one drive, water circulating brakes on lower drum and with Foster friction spinner cathead and American Simplomatic breakout cathead. Powered by Waukesha 6-WAKU gas engine equipped with butane heat exchanger. Spudder has been completely reconditioned and motor is in excellent running condition. Has not been run since overhaul. Rig will be given 90 day guarantee. Priced reasonable. Box E-837, The Oil and Gas Journal, Tulsa, Oklahoma.

1—22-L BUCYRUS-ERIE Spudder complete with all tools, electric welder, light plants, dog house, GMC 6x6 Army truck and 1948 Federal truck inventory furnished upon request. Price: $13,000.00. Buckeye Supply Company, Zanesville, Ohio.

WELL drilling equipment, new or used. Spudders, rotaries, core & shot hole drills, tools, pipe, bits, blocks, pump jacks, valves. Everything for well drilling and service. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE: New 5,000 Bbl. Cap. API 10 Gauge Bolted Steel Tank. Ready to Ship. Attractive Price. Lestan Corp., Rosemont, Penna.

FOR SALE in the Seminole area, a number of 250 bbl., 500 bbl., and 1,000 bbl. bolted steel tanks now erected on lease locations. List and prices upon application. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

GASO Model 1860, 2½" to 4½" x 6" Duplex Power Pumps—Skid Mounted with Model K-428 BUDA Gasoline Engine—Unit Complete with V-Belt Drive, Belt Guard, etc. — Condition Guaranteed — 6 Available.

HALLORAN EQUIPMENT CO.

5702 Harvey Wilson Dr., Houston 20, Tex.

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Line Pipe Available Immediately

12¾" — .375 wall — 50#

8⅝" — .322 wall — 28.55#

6⅝" — .280 wall — 18.97#

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TULSA, OKLA.

Call 2-8498 **Write P. O. Box 7203**

EQUIPMENT FOR SALE

LARGE Tonnages OIL WELL CASINGS available for delivery last quarter 1952, J-55 Pipe any standard diameter, standard weights and lengths also External Upset Tubing standard API specifications. Telegraph or write Box E-966, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Practically new Ruska Permeameters Cat. No. 1011. Hughes Engineering Company, 614 Westbrook Hotel, Fort Worth, Texas.

EQUIPMENT WANTED

WE BUY well drilling equipment machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

WANTED: Three engine compound for Wilson Titan drawworks. Makin Drilling Company, Box 1628, Phone 3-3141, Hobbs, New Mexico.

WANTED: 1 — Boiler approx. 25,000 # Steam per hour 300 # WP. 1—Vacuum Jug approx. 8' dia. with trays. 1—Crude Oil Fractionator 8' dia. with 20 to 25 trays. Send price and full particulars to Northwestern Refining Co., St. Paul Park, Minnesota.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1363, Tulsa, Oklahoma.

WANTED: Laboratory equipment, gum testing apparatus, air jet and ind period. Send full particulars to Northwestern Refining Co., St. Paul Park, Minnesota.

USEFUL MECHANICAL PRODUCTS
needing
Introduction and Sales Representation
to
Oil—Gas—Chemical industries located in Ohio, West Virginia, and Western Pa.
by
Engineers with well developed contacts
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Tulsa, Oklahoma

HELP WANTED

ASSISTANT Controller — Integrated oil Company in Mid-Continent area is seeking an experienced Assistant Controller. Position requires top-level man with experience in oil, systems and costs. Please submit resume which must give complete data on experience, salary requirements, and personal history, including education, background and associations. Box E-965, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Petroleum Engineer with from two to five years' experience wanted for work on staff of large independent producer. Duties involve subsurface geology, development, production, and reservoir engineering in California or Rocky Mountain area. Give references, details of education and experience in first letter, and enclose photograph. Box E-956, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: SEISMIC SUPERVISOR. Must have Party Chief experience, age 30 to 38, degree Geology or Geophysics. Replies will be kept strictly confidential. Call or write giving complete experience. A. E. "Sandy" McKay, Continental Geophysical Co., 602 Continental Life Building, office phone Fannin 9231, Residence phone Sunset 6053, Fort Worth, Texas.

WANTED: Purchasing agent for refinery and production operation. Must have sufficient experience in accounting ability to maintain perpetual inventories, meet government purchasing requirements, etc. Box E-939, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Industry needs experienced production engineers; field, well-sitting, and general geologists; refinery supts.; petroleum draftsmen. Write Professional Placement Service, 516 University Bldg., Denver, Colorado.

GEOPHYSICIST. Hunt Oil Company. Should have at least twelve years experience in varied areas. Must be capable of supervising contract crews and competent at interpreting seismic data. Will be based in Dallas. Excellent opportunity. Furnish complete background data to 718 Mercantile Bank Building, Dallas, Texas.

HELP WANTED

HELP WANTED

PROJECT ENGINEER

National Engineering and Construction Company seeks an experienced Project Engineer with several years of petroleum engineering background for work in the Midwest.

This man must be capable of taking complete charge of a job, supervise layouts and design, select plant equipment, and maintain amiable customer relations.

In applying furnish a detailed resume of your education, experience, references and a recent snapshot. Salary open.

Box E-964, The Oil and Gas Journal, Tulsa, Oklahoma

WANTED: Experienced seismic party chiefs, observers and computors for service in Central and South American countries. Must be prepared to fulfill two year contracts at appropriate salary. Assignments starting not later than December 1952. Write giving details of experience and education. Letters will be held confidential. Box E-928, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMIST for western Kansas refinery. To be responsible for refinery products control. Prefer some asphalt experience. Permanent position. Salary commensurate with experience and ability. Box E-942, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC PERSONNEL needed for United States and Canada by well known and expanding contract geophysical company. Address Box E-963, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

PETROLEUM ENGINEER wanted by independent oil company in West Texas. Require two to four years working experience in drilling and production. Reply in detail stating education, experience, age, marital status and starting salary desired. Box E-958, The Oil and Gas Journal, Tulsa, Okla.

PETROLEUM GEOLOGIST wanted in West Texas by independent oil company. Desire one to three years of practical experience in sample work and subsurface mapping. Reply should give experience, education, age, marital status and starting salary required. Box E-959, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

CHEMICAL Engineer: Age 37, family. Fourteen years petroleum industry experience in process engineering, production supervision, maintenance, investigations, reports and correspondence. Desires administrative position on managerial level with company in petroleum or related field. Present salary $9000. Box E-967, The Oil and Gas Journal, Tulsa, Oklahoma.

CONSULTING ENGINEER. Available for fee or retainer representation in Rocky Mountains, Permian Basin, and Kansas. Evaluations and Supervision of Royalty or Operating Interests. Geological Reports and Deal Negotiations. References. Box E-968, The Oil and Gas Journal, Tulsa, Oklahoma.

PROJECT Engineer-Estimator: Processing and boiler plants, utility and high-pressure piping, material-handling, structural framing, heavy foundations; present salary, $9,000. Box E-952, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY Executive, 19 years broad experience in Engineering, Operations, and Administrations. College degree in Engineering. Executive training. 40 years old. Married. Available October 1st. Box E-960, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628. Ph. No. 3-3141, Hobbs, New Mexico.

DESIRE Sales Position in Oil Industry, preferably in West Texas area. 34 years old. College education. Previous experience: 2 years sales engineer, selling Heavy Industrial Equipment, 5 years on Drilling Rig. Now employed as Tool Pusher. Box E-970, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Mechanical Engineer, Age 36, desires to relocate. Eleven years varied experience in supervision of refinery maintenance, construction and inspection. Four years experience as safety engineer. Will consider foreign employment. Box E-977, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN for small independent operator. Applicant desires position to use all of experience. Capable of exploration and development geology, finding drilling prospects, supervision of drilling and production. Interested in land work although experience limited. Desire West Texas or Louisiana but experienced in Texas, New Mexico, Louisiana and Oklahoma. Age 35, presently employed as district geologist—a really good job, but desire opportunity of better salary or salary and interest. Excellent references and available on reasonable notice. Box E-976, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE LINE Construction Superintendent. Presently employed. Want association with major pipe line construction or engineering firm. Twenty-six years experience with major operating companies. Will furnish references from reliable sources. Box E-971, The Oil and Gas Journal, Tulsa, Okla.

LEASE AND DRILLING BLOCKS

SITUATIONS WANTED

PRODUCTION SUPERINTENDENT. Graduate Petroleum Engineer. 12 years responsible experience producing industry. Geological ability. Mid-Continent or Rocky Mountains. Box E-774, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—Age 35—married—10 years major company experience in Arkansas, Mississippi, Louisiana, East and West Texas—desires position with small major or independent oil company, located in Fort Worth or Dallas area. Box E-950, The Oil and Gas Journal, Tulsa, Oklahoma.

CORROSION ENGINEER, Ph.D. Chem. Eng. (1942). Nine years experience directing development and application of corrosion inhibitors in petroleum production and refining. Publications and patents. Desires responsible position in West, or foreign. Box E-954, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST 12 years major company diversified experience geology, scouting, leasing. Available. Will go anywhere. Box E-973, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST — University of Wisconsin Graduate, Single, Age 29, wants job in lab and field work. Midwest preferred. Box E-975, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL Engineer: Registered in Texas, age 31. Five years general experience Natural Gas and Gasoline Industry, two years supervisory category. Desires project engineering or equal position with progressive company. Box E-972, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer desires to supervise drilling, completions and production for independents in West Central Texas on retainer basis. Box E-946, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

WILL give 113 acre lease for 90 day drilling contract, 1 year lease, 5000' test. One time good producer, location Young County, Texas, Mary E. Criswell Survey, Abstract #1772, known as the J. W. Burnett sub-division Section 2, Block C. Reserve right to withdraw offer any time. Inquire Box 722, Clifton, Arizona.

FOR SALE: Production on three stripper leases with proven offsets in Hughes Co. 28 wells 5 years old fully equipped. Box E-974, The Oil and Gas Journal, Tulsa, Oklahoma.

700 FT. OHIO Oil Leases, 15 wells 110A. up. Low cost water input wells raises oil. Easy terms. E. N. Rehler, Allegany, N. Y.

POTENTIAL Gas Lands for lease; several producing wells in territory; three gas lines through territory making ready market. For information, write Critchett & Woods Lumber Co., Inc., Olla, Louisiana.

LEASES ROYALTIES

Producing and Nonproducing

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Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis 5, Mo.

ATTENTION
OIL MEN AND INVESTORS

Two thousand acres proven and semi-proven in Oklahoma and Kansas. Some has oil production on three sides. Fifteen thousand acres with oil and gas shows in New Mexico. Major interests for drilling and equipping $20,000 minimum. Defnitely not a promotion scheme. References available. Consult your accountant for tax advantages. Address: 11451 Berwick Street, West Los Angeles 49, Calif.

LEASE AND DRILLING BLOCKS

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver Colorado.

FOR LEASE: The owners of the land and/or the mineral rights on 75,000 acres in Northeastern Louisiana would like to secure proposals for exploration and development on large or small acreages. One producer on the tract. Box E-864, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

WE will buy producing or non-producing oil royalties. Standard Security Company, 111 Broadway, New York 6, N. Y.

WILLISTON BASIN ROYALTIES

Dealers in Montana royalties since 1921, we now specialize in royalties under major company leases in the Montana portion of the Williston Basin. For information on our method of operation, write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.

JACK EAGLE—Pay you immediately for your producing royalties and Overrides, absolutely no delay, send complete details. 706 City Nat'l Bldg., Okla. City, Okla. REgent 6-7027.

PRODUCTION

We Will Buy

PRODUCING landowners royalty and producing leases. Any amount, any area. Confidential information required and furnished. A 1 Bank Reference.

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Amarillo, Texas

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OVERLYING DESIRABLE OIL AND GAS RIGHTS

227,000 acres owned land with over 3,000 good quality Hereford cattle. Taylor grazing rights for 5,800 cattle. Summer and winter ranges. Ranch well watered from creeks and springs and provided with large reservoirs. Through drift fences this property controls almost exclusively over 600,000 acres well blocked. Light winter feeding, some years none. Now cuts about 3,000 tons hay and can be made to cut 10,000 or more tons or converted to grain or sugar beets. Ranch fully equipped with modern machinery. Buildings, old but serviceable and adequate. Price of ranch, cattle and equipment $1,400,000. This property located in northeastern Nevada owns, OIL, GAS AND MINERAL RIGHTS FOR 126,000 ARES NOW BEING PROSPECTED BY MAJOR OIL COMPANIES. Full information to qualified buyers. Write HAYDEN HENDERSON, Licensed Broker, Elko, Nevada.

BUSINESS OPPORTUNITIES

CAPITAL WANTED FOR EXPANSION

Have water flood started. Have increase of 10 times as much oil as 40 days ago. Still increasing. Have 350 a. to drill. Let me show you facts and figures. Don't answer unless you have money to invest. (Illinois Project), Box 112, Nestor, California.

PAD Gas Council to Meet

WASHINGTON.—The gas advisory council of the Petroleum Administration for Defense will meet in Washington September 19.

The council will consider the results of the recently completed PAD study of future natural gas requirements through 1955.

Other major subjects of discussion will be the outlook for probably critical materials and allocations of materials to the gas industry.

EQUIPMENT MEN

(Continued from page 186)

Hensley Assigned to Tulsa Office of Cooper-Bessemer

R. E. HENSLEY

The assignment of Robert E. Hensley to Cooper-Bessemer's Tulsa office was recently announced by Stanley E. Johnson, Cooper-Bessemer vice president. Working under the direction of Byron L. Potter, branch manager, Hensley will concentrate his efforts to engineering and installation of diesel engines and gas and air compressors for pipe lines, refineries, and chemical plants in the Oklahoma area.

An engineering graduate of Oklahoma A. & M., Hensley received his specialized training in engine and compressor operation at Cooper-Bessemer's headquarters plant in Mount Vernon, Ohio.

Johnston Is Appointed Executive Vice President

T. M. JOHNSTON

Johnston Testers, Inc., recently announced the transfer of T. M. (Tommie) Johnston from the West Coast office in Los Angeles to company headquarters in Houston. With this move the company simultaneously announced his appointment as executive vice president and assistant to W. B. Taylor, president.

Johnston has been a vice president and a director of Johnston Testers since formation of the company in 1951 to purchase the complete assets of four companies from M. O. Johnston. At that time he was general manager of the Rocky Mountain and West Coast divisions, as well as head of the export division.

Johnston began his oil-field career as a roughneck in Smackover field, Arkansas, in 1921, while still in school. He entered the well-testing business with M. O. Johnston in 1932, after reaching the status of driller in the East Texas boom, and became a service operator in California. In 1931 he was transferred to the export department and traveled extensively in South America, Mexico, West Indies, and Canada, until 1941 when he was made general manager of the West Coast and Rocky Mountain division.

Dowell Promotes Three In Wichita District

E. H. NIELSEN

A. C. Polk, general manager of Dowell Incorporated, Tulsa, has announced promotions of three men in the Wichita district.

E. H. Nielsen is now assistant district manager; W. F. Brown is district sales manager, and M. E. Hanson is district area manager.

Nielsen will direct Dowell's activities in the Rocky Mountain area with an office at Denver. He joined Dowell in October 1944 as engineer at Great Bend, Kans., and transferred to the general office at Tulsa in July 1949 as general sales engineer.

W. F. BROWN

M. E. HANSON

Brown started with Dowell in April 1936 as a student treater at Great Bend. He has held positions in Dowell in many locations—Shreveport, Flora and Salem, Ill., back to Great Bend, and in 1945 transferred to the Wichita district office as district sales engineer. In April 1952 he was promoted to district area manager. As district sales manager, Brown will handle and correlate sales training and sales development throughout the entire district.

Hanson joined Dowell on October 2, 1946, as treating engineer at Great Bend. Hanson transferred to Hugoton, Kans., as development engineer in December 1946. He was development engineer at Ulysses, Kans., from February 1947 until June 1951 when he was promoted to the district office at Wichita. In April 1952 he was promoted to district area manager. Hanson's new promotion does not entail a change in title but an increase in responsibility. He will oversee Dowell developments in the eastern part of the Wichita district.

Central Area

(Continued from page 179)

Muhlenberg County: Westfall et al 1 Grace, NE SW NE SW 15-H-29, dry, TD 1,170 ft.

Ohio County: C. Faith et al 1 Powers, W½ SW NW SE 24-N-34, dry, TD 590 ft.

Union County: George Hoffman et al 1 Hancock, EL NW NE SE 22-P-21, dry, TD 2,731 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Casco Township: Louis Zellman 1 Steele, NE SE NW 13-1n-16w, Traverse 1,187 ft., dry, TD 1,256 ft.

Arenac County, Moffatt Township: W. B. Stewart 1 State-Moffatt, SE NW NW 29-20n-3e, Dundee 2,954 ft., dry, TD 3,064 ft.

LEGAL

20,529.11 ACRES of Tribal and 57.91 ACRES of restricted Allotted Indian lands located within the jurisdiction of the Uintah and Ouray Indian Reservation, Townships 14 and 15 South, Ranges 19 and 20 East, Salt Lake Base Meridian, in Uintah County, State of Utah, are being advertised for oil and gas lease sale, bids on which will be opened 2:00 P.M., September 30, 1952, at the office of Harry W. Gilmore, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

LEGAL

42.72 ACRES of restricted Allotted Indian lands located within the jurisdiction of the Uintah and Ouray Indian Reservation, in Uintah County, State of Utah, in Township 10 South, Range 23 East, Salt Lake Base Meridian, are being advertised for oil and gas lease sale, bids on which will be opened September 25, 1952, at 2:00 P.M., at the office of Harry W. Gilmore Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency."

"Yeth, mam, thath right—Perthival Thmith—routhabout!"

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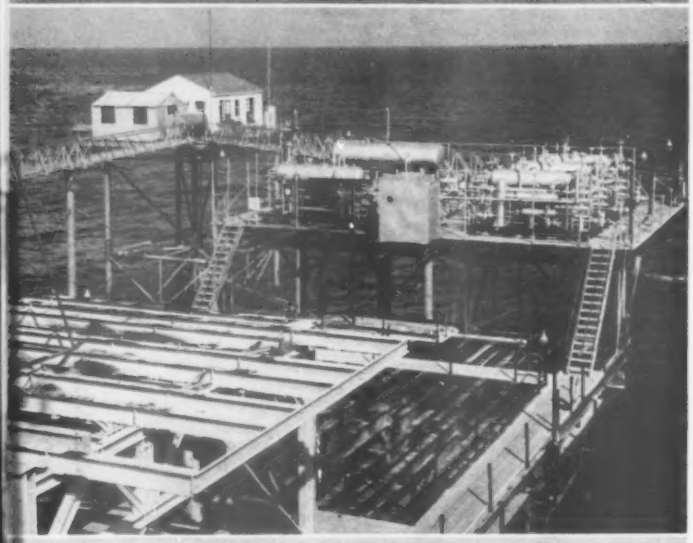
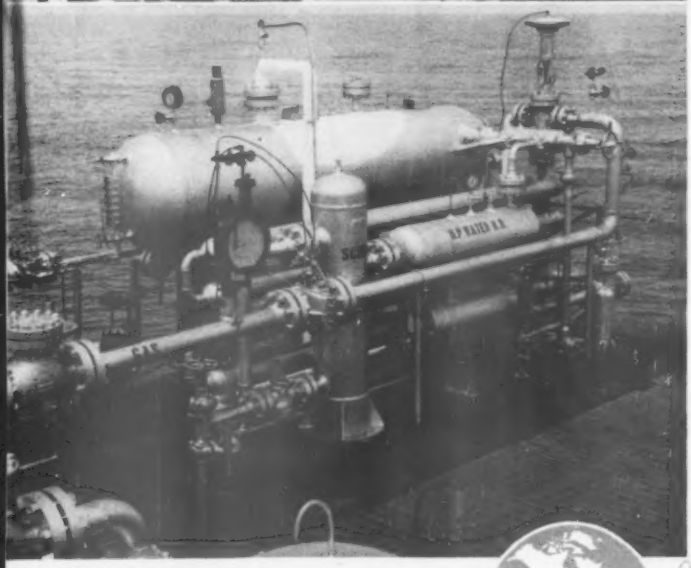
LEGAL

Sealed bids for oil and gas mining leases on 742.19 acres of trust lands on the Crow Indian Reservation, Big Horn County, State of Montana, will be received at the office of the Superintendent, Crow Indian Agency, Crow Agency, Montana, up to 2:00 o'clock P.M., Mountain Standard Time, September 26, 1952. For further information, call or write L. C. Lippert, Superintendent, Crow Indian Agency, Crow Agency, Montana.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the SE¼NE¼ sec. 15, T. 44 N., R. 98 W., 6th P.M., Wyoming, 40 acres, within the known geologic structure of the Hamilton Dome field, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, on September 24, 1952, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Cheyenne, Wyoming, or to this office. Marion Clawson, Director.





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The following standards for the separation equipment were set by the producing company:

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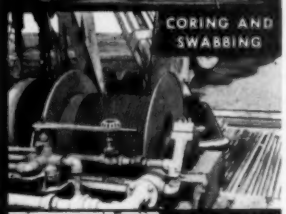

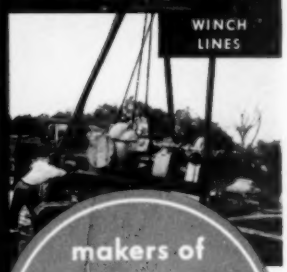

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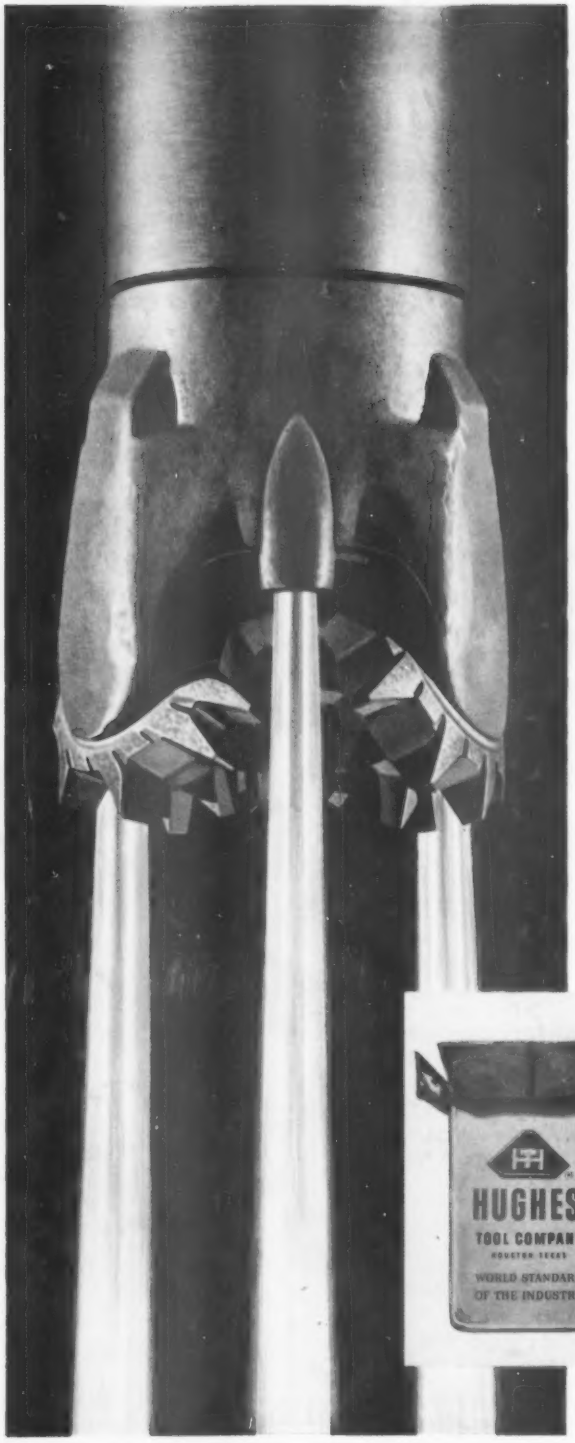

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